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Some Foundry Troubles and Their Remedy

Handling 16 Tons to Make One 230-Lb. Bathtub— Layout of Foundry Floors to Minimize Steps of Molders

BY HENRY M. LANE

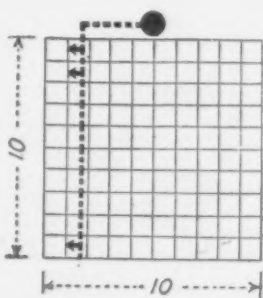
MOST foundrymen think that their business is always full of trouble, but that just now they have more than their share, and I am inclined to think they are right. The aftermath of the war left us with a labor shortage. The result is that many of our foundries, and particularly foundries of the snap molding class or light work class, are short of help and must remain short of help when judged by the pre-war basis. The answer is to be found to the problem "how can we get out more castings with less men, and still pay high wages?" We have been facing this problem ever since there was a foundry industry in the United States, and we will face it again and solve it.

As has been stated many times before, the production of castings involves three things: metal, material and man-hours. To produce one ton of ordinary gray iron castings takes about 2040 lb. of metal purchased, and in some cases more. I happen to have available the material sheet for a large foundry producing a line of castings varying all the way from relatively small to those weighing several tons. For producing castings this list shows some forty-odd separate items purchased, including various grades of metal, fire brick, fire clay, different grades of sand, fluxes, core compounds, facing, core binders, core sand, etc. Working this out into pounds of everything necessary to produce one ton of castings, averaged over a period of years, amounted to 3105.84 lb. In other words, over $\frac{1}{2}$ lb. of other material was purchased, and used up, for every pound of castings produced in this shop. The coke purchases for core ovens, foundry and all, showed that they got about 4.6 lb. of castings per pound of coke. The above quantities do not include flask lumber or other similar supplies involved in equipment.

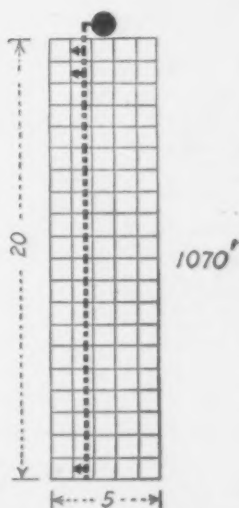
By digging this far into the thing it did not look as though there was very much chance for cutting down the man-hours, and they appeared to be the only thing on which we could make our saving. The next question

was what are the man-hours for? Before proceeding to a study of the material handling involved in making 100 lb. of casting, it might be well to consider the shape of floors used by men. We all know that the center of a circle is on an average closer to every point within the circle than the center of any other inclosing form of equal area, but foundry floors are generally rectangular.

If we imagine a square floor with a mold in the center at one side of it, and 100 molds set on this floor, each mold in a square, and being set tight together, and we then figure the distance traveled by the man in units of mold width, which would amount to the same thing as if the molds were all 1 foot square, and we also figured that the man walks along the front of his row, and then down the row, which gives a little more traveling in the case of a square floor than it would



Square Foundry Floors Require Fewer Steps Than Other Shapes. In this case the saving is 44 per cent—from 1070 to 605—whether expressed in steps, in feet, or any other convenient unit



in the case of a rectangular floor, we have the following figures:

With 100 molds set down ten on a side, the total amount of traveling to set the molds down is 605 ft., and the same amount for bringing them back. If we now take a floor 5 ft. wide and 20 ft. long, and follow the same rule, we find that our man must travel 1070 ft., which approaches twice the amount he had to travel in the other case. In other words, we find that a square floor is more economical from a carrying standpoint than a long, narrow one. Foundrymen have a tendency to crowd their men close together, and give them long, narrow floors in order to save gangway space, but when we come to the design of continuous foundries we find that the nearer square we can make the man's working floor the greater output we can get from him. This little point is worthy of study. In many cases, by the addition of a few gangways the output of a plant may be considerably increased.

Other handling problems which involve the carrying of materials over a given area can be analyzed in the same way.

Table I shows the necessary handlings to produce a 100-lb. automobile casting, and very little explanation is necessary. For instance: pig iron must be lifted from the car and piled in the yard, which necessitates two handlings at this point. Later it has to be taken from the pile to the scales, off at the scales to the platform,

Table I.—Handling Involved in Making a 100-Lb. Automobile Casting

	Lb.
Handling 105 lb. of iron from car and piling in yard, 2 handlings.....	210
Handling coke and trimming back into bin, 11 lb., 1½ handlings.....	16½
Shoveling limestone into bins.....	4
Shoveling molding sand into bin and trimming back, 30 lb., 1½ handlings.....	45
Shoveling core sand into bin and trimming back, 80 lb., 1½ handlings.....	120
Handling iron from pile in yard to scales, off scales into cupola, and carrying molten iron to flask, 130 lb., 4 handlings.....	520
Handling coke from bin to cupola or core ovens, 11 lb., 3 handlings.....	33
From the drop we have 2 lb. to be handled twice.....	4
4 lb. of limestone had to be handled 4 times, including drop.....	16
Of the incoming molding sand 20 lb. went straight to the heap or one handling, and 10 lb. had to be handled 4 times because it was made into facing sand, and then delivered to the molder. This makes 20 lb. plus 40 lb.....	60
The sand heap required for one mold contained 300 lb. of sand, and this required three cut-overs with the shovel for tempering, plus shoveling into the mold, 300 lb., 4 handlings.....	1,200
The 90-lb. flask onto the machine.....	90
floor.....	390
Carrying the flask from the machine to the The cope was set down on edge on the floor and had to be closed subsequently.....	190
80 lb. of cores to be set into the mold.....	80
In the making of the 80 lb. of cores it required three handlings of the core sand to get it from the bin into the boxes.....	240
Handling the cores and core plates from the bench to the rack and off the rack represents.....	240
Handling the core plates and driers back to the core makers.....	40
During inspection, pasting and delivery of the cores involved 4 handlings of 80 lb....	320
Piling the flask back from the floor.....	90
Casting gates and cores and lifting off the floor.....	210
Handling casting at knockout.....	210
Handling sand from knockout to the dump, 2 handlings of 90 lb.....	180
Handling sprue from knockout to the yard, 2 handlings of 30 lb.....	60
Handling castings to tumbling barrels and out to the sand blast, in and out through inspection, 2 handlings; through chipping, 2 handlings, and onto a truck for shipping and off the truck into the freight car involves a total of 10 handlings at 100 lb..	1,000
Total amount lifted to produce 100 lb. of casting.....	5,568½

then into the cupola, and then handled in the molten state to the mold, making four handlings. Following this same reasoning it is easy to check over the list and to see that to produce this automobile casting and get it out of the shop with the least possible handling, we had the equivalent of lifting 100 lb. over 55 times, or more than 55 lb. had to be handled to every pound turned out. Also, when we consider that it was generally lifted two or three feet each time, the number of foot pounds involved will readily be appreciated.

This is really a very low figure. In the case of one concern where a similar study was made it showed 240 lb. to be lifted and set down again to produce a pound of casting. In the case of the automobile casting, owing to the loss in melting, grinding, chipping, etc., we had to use 105 lb. of iron to make 100 lb. of casting; about 30 lb. of molding sand, 80 lb. of core sand, 4 lb. of limestone, 11 lb. of coke for use in the cupola and core ovens. For pouring the castings it was necessary to melt, including the return, 130 lb. of iron, the flask required 300 lb. of molding sand, and the flask weighed 90 lb., the various cores which entered into the job required 40 lb. of core plates and core driers.

There are certain other lines of work in which larger flasks are handled by cranes. To illustrate a typical case of this kind we show in Table II the molding of a 230-lb. bath tub in which we have 137 lb.

handled or, including the enameling and shipping to the store room, 145 lb. handled, for every pound produced.

In this case we have used the minimum amount of handlings possible to produce the tub. In practice there are many more handlings generally involved. The tub weighs 230 lb. net, and takes 300 lb. of iron to pour it, the flask weighs 2700 lb. and contains 1800 lb. of sand. Operations for making one bath tub are detailed in the table.

Our chance for reduction of cost in modern American practice lies almost wholly in this handling end. It is rare that we can make much of a saving in the metal, and we can make only minor savings in the auxiliary material, but our big savings must come from the labor end. We may accomplish something by a better arrangement of departments and working space so as to reduce foot pounds of energy necessary to turn out the product and thus decrease the man-hours expended, or we could substitute mechanical handling for some of the manual work. In the case of the bath tub flask, all of the heavy lifts are naturally made with a crane and the sand is cut over with a sand cutter, or with mechanical equipment, but it still involves the handling problem, and the question is to get this handling problem down to the lowest cost for a given output.

It is in this field that the foundry engineer finds his opportunity to help American foundrymen reduce the cost of their castings. It is true that everyone connected with the foundry will to some extent act as foundry engineer if he devotes his time to this problem. A mistake, however, which is frequently made is to call in the manufacturer of some certain type of equipment, and tell him to see what he can do for you. Many manufacturers are very careful when called in this way, but others show a tendency to sell the foundry

Table II.—Handling Involved in Making a 230-Lb. Bath Tub

	Lb.
Loading 240 lb. of iron in the yard, 2 handlings.....	480
45 lb. of coke in the yard, 1½ handlings....	67½
12 lb. of limestone in the yard.....	12
50 lb. of molding sand in the yard, 1½ handlings.....	75
300 lb. of iron to the scales, onto the charging platform, into the cupola, and in molten state to mold, total of 4 handlings.....	1,200
45 lb. of coke, 3 handlings.....	135
6 lb. of drop, 2 handlings.....	12
12 lb. of limestone, 4 handlings, including drop.....	48
50 lb. of sand, 2 handlings.....	100
Molding and subsequent operations:	
1800 lb. of sand, 4 handlings during tempering and placing in flask.....	7,200
2700 lb. of flask onto the machine.....	2,700
Sand and flask to the closing operation....	4,500
Sand and flask to pouring.....	4,500
The same plus iron to the shakeout.....	4,800
The flask returned to the molding floor....	2,700
The iron in casting to trucks.....	300
Sprues to the yard.....	70
Off truck at scratch department, back on truck, off at gate grinding and back on, off at sand blast and back on, at the enameling department 4 handlings, onto the truck and off at the stock room, which makes not less than 11 handlings or.....	2,530
50 lb. of sand to the dump, 2 handlings....	100
Total to produce 230 lb. of casting.....	31,529½

drymen as much of their equipment as they can, whether it is the best for the job or not.

It is undoubtedly true that American foundries must in the next few years see a greater concentration and specialization of product, and a greater tendency to substitute mechanical means for manual labor.

The Abrasive Company, Philadelphia, reports that after an extended period of comparative inactivity it is now operating on a 90 per cent basis. Actual betterment was first noticed during March and since that time there has been a most gratifying increase each month until the 90 per cent production figure has been reached. Indications point to further betterment and in consequence the Abrasive company is making a number of plant changes to more adequately handle increased business.

Steels for Automobile Construction

Standardized Steel Specifications of the German Automotive Industry—What the Various Symbols and Designations Signify

BY BENNO R. DIERFELD

TO-DAY'S production of steels for automotive vehicles is a clear technological process, and the methods for testing their quality are simple and may be performed easily. However, the great number of kinds of steel existing not only renders difficult the

selection of steel suitable for a certain purpose, but also has the great economic drawback that the manufacturer or dealer is compelled to keep in stock a great variety of steels for products of similar kind. Furthermore, it is possible for only a few factories continuously to

TABLE I.—SUMMARY OF AUTOMOTIVE STEELS

CONSTRUCTION STEELS:	Unrefined Simple Case-hardening Steel up to 0.15			Semi-Refined Case-hardening Steel 0.16 to 0.25			Refined Steel, Not for Case-hardening 0.26 to 0.45			Highly Refined Spring Steel, Natural State 0.5 to 0.7		
	Symbol	Tensile Lb. per Sq. In.	Elongation %	Symbol	Tensile Lb. per Sq. In.	Elongation %	Symbol	Tensile Lb. per Sq. In.	Elongation %	Symbol	Tensile Lb. per Sq. In.	Elongation %
Carbon, per cent, about.....												
<i>Unalloyed:</i>												
Construction Steel, Mn up to 0.8%; Si up to 0.3%; Cr up to 0.5%.....	11a	71,100	25	12a	85,300	20	13a	114,000	15	14a	128,000	10
Basic open-hearth steel, S and P up to 0.05%.....	11b	57,000	25	12b	71,100	20	13b	99,500	15	14b	114,000	10
Commercial quality steel.....	11c	57,000	20	12c	71,100	15	13c	99,500	10	14c	114,000	7
<i>Low Alloy Steels:</i>												
Manganese steel, Mn over 1%.....	21m	64,000	30	22m	85,300	25	23m	99,500	20	24m	128,000	12
Manganese-Silicon steel, Mn over 1%; Si over 0.5%.....	21m/s	.....	.....	22m/s	92,400	18	23m/s	121,000	12	24m/s	.....	.....
Manganese-Silicon steel, C 0.5%; Mn 1.1%; Si 0.5 to 1.6%.....	.....	.....	.....	.....	.....	.....	23m/s	99,500	15	.....	.....	.....
Chromium-Silicon steel, Cr over 1%; Si over 0.5%.....	21c/s	.....	.....	22c/s	92,400	* 20	23c/s	121,000	† 15	24c/s	142,200 ** 12	
Chromium-Silicon Steel, Cr over 1%; Si over 0.5%; case-hardened.....	.....	.....	.....	22c/s	128,000	* 10	23c/s	142,200	† 12	24c/s	206,000 *** 9	
Vanadium Steel, Va over 0.5%.....	21v	.....	.....	22v	92,400	‡ 20	23v	121,000	15	24v	.....	.....
Vanadium Steel, Va over 0.5% case-hardened.....	.....	.....	.....	22v	128,000	10	23v	142,200	12	.....	.....	.....
<i>Alloy Steels:</i>												
Nickel Steel, Ni over 4%.....	31a	64,000	Δ 35	32a	85,300	α γ 30	33a	99,500	β 25	.....	.....	.....
Nickel Steel, Ni over 4%, case-hardened.....	31a	92,400	Δ 25	32a	121,000	α 15	33a	114,000	β 22	.....	.....	.....
Nickel Steel, Ni about 3%.....	31b	64,000	Δ 30	32b	85,300	α ε 25	33b	99,500	β 22	.....	.....	.....
Nickel Steel, Ni about 3%, case-hardened.....	31b	92,400	Δ 20	32b	121,000	α 12	33b	114,000	β 20	.....	.....	.....
Nickel Steel, Ni under 2% (about 1.5%).....	31c	64,000	Δ 25	32c	85,300	α λ 22	33c	99,500	β 20	.....	.....	.....
Nickel Steel, Ni under 2% (about 1.5%), case-hardened.....	31c	92,400	Δ 15	32c	121,000	α 10	33c	114,000	β 15	.....	.....	.....
Nickel-chromium Steel, Ni about 3.5%; Cr about 1.5%.....	41a	85,300	Δ 20	42a	99,500	α μ 20	43a	114,000	β 22	.....	.....	.....
Nickel-chromium Steel, Ni about 3.5%; Cr about 1.5%; case-hardened.....	41a	121,000	Δ 12	42a	170,600	α 8	43a	142,200	β η 12	.....	.....	.....
Nickel-chromium Steel, Ni about 1.5%; Cr about 0.8%.....	41b	78,200	Δ 20	42b	92,400	α ψ 18	43b	106,600	β 16	.....	.....	.....
Nickel-chromium Steel, Ni about 1.5%; Cr about 0.8%; case-hardened.....	41b	114,000	Δ 12	42b	142,200	α 8	43b	128,000	β 10	.....	.....	.....
Nickel-tungsten Steel, Ni about 3%; Wo about 1.5%.....	.....	.....	.....	52	92,400	θ ψ 20	53	121,000	φ 15	.....	.....	.....
Nickel-tungsten Steel, Ni about 3%; Wo about 1.5%; case-hardened.....	.....	.....	.....	52	149,300	θ 8	53	156,400	φ 10	.....	.....	.....
Chromium Steel, Cr 1.5% or over.....	61	71,100	|| 20	62	85,300	Λ π 18	63	106,600	⊙ 15	64	.....	.....
Chromium Steel, Cr 1.5% or over; case-hardened.....	61	92,400	|| 10	62	128,000	Λ 8	63	128,000	⊙ 8	64	.....	.....
<i>High Alloy Steels:</i>												
Nickel Steel, Ni 36%.....	71a	.....	.....	72a	.....	.....	73a	.....	.....	.....	.....	.....
Nickel Steel, Ni 30%.....	71b	.....	.....	72b	.....	.....	.....	.....	.....	.....	.....	.....
Nickel Steel, Ni 25%.....	71c	.....	.....	72c	.....	.....	.....	.....	.....	.....	.....	.....
Manganese Steel, Mn 5 to 6%.....	.....	.....	.....	82	.....	.....	.....	.....	.....	.....	.....	.....
TOOL STEELS:		Soft 0.6	Tough 0.7	Tough-hard 0.9	Medium-hard 1.1	Hard 1.25	Very Hard 1.45	Special Steels 1.6 2.2				
Carbon, per cent, about.....												
<i>Unalloyed:</i>												
Simple tool steel.....	101		102	103	104	105	106	.....	.....	.....	.....	.....
Weld Steel.....	111			113	.....	115	.....	.....	.....	.....	.....	.....
<i>Alloy Steels:</i>												
Steel with chromium and tungsten.....	.....		.....	123	124	.....	126	.....	.....	.....	.....	.....
Manganese Steel.....	.....		.....	.....	134	.....	.....	.....	.....	.....	.....	.....
Chromium Steel, Cr over 2%.....	.....		.....	.....	.....	145a	.....	.....	.....	147a	.....	.....
Chromium Steel, Cr under 2%.....	.....		.....	.....	.....	145b	.....	.....	.....	.....	.....	.....
Tungsten Steel.....	.....		.....	.....	.....	.....	156	.....	.....	.....	.....	.....
<i>High Alloy Steels:</i>												
Chromium Steel, Cr 12%.....	.....		.....	.....	.....	.....	.....	.....	.....	.....	168	.....
High-speed, tungsten steel, Wo over 13.5%.....	171a		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
High-speed, tungsten steel, Wo 10 to 13.5%.....	171b		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
High-speed, chromium steel, Cr not over 18%.....	171c		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
High-speed, cobalt steel.....	181		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
High-speed, war quality, with tungsten, molybdenum and chromium.....	191		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* C, 0.25%; Mn, 0.85%; Cr, 1.2%; Si, 0.55%.

† C, 0.4%; Mn, 0.85%; Cr, 1.25%; Si, 0.55%.

** C, 0.55%; Mn, 0.8%; Cr, 1.5%; Si, 0.8%.

†† At about 650 deg. Cent. (1200 deg. Fabr.).

γ When refined, 106,600 lb. per sq. in. and 15% elongation.

γ When refined, 99,500 lb. per sq. in. and 22% elongation.

γ When annealed, 78,200 lb. per sq. in. and 25% elongation.

Δ When refined, 99,500 lb. per sq. in. and 20% elongation.

μ When refined, 99,500 lb. per sq. in. and 15% elongation.

• When refined, 128,000 lb. per sq. in. and 12% elongation.

• When refined, 121,000 lb. per sq. in. and 12% elongation.

• When refined, 106,600 lb. per sq. in. and 10% elongation.

Δ C, 0.15%; Mn, 0.3%.

α C, 0.25%; Mn, 0.4%.

β C, 0.45%; Mn, 0.6%.

θ C, 0.25%; Mn, 0.6%.

φ C, 0.45%; Mn, 0.5%.

|| Cr, 1.5%; Mn, 0.3%.

Λ Cr, 2%; Mn, 0.4%.

• Cr, 2%; Mn, 0.6%.

γ Refined.

make comparative tests of the different kinds or products of steel, on account of the high laboratory costs.

Therefore, both the designer and the manager of the factory are obliged to continue using the kinds of steel already known to them, because they could not well take the risk of introducing a competitor's steel said to be equivalent to the sort formerly used, or even better. Of course, the full utilization of favorable orders was hardly possible with the old system, especially if the steel works suddenly stopped delivery on account of strikes, etc., and a rational storing of stock was difficult.

All these facts led peremptorily to a standardization of steel, and the German pioneers in this direction are Frank Popp, director, and Walter Pessl, head laboratory engineer, of the Bayerische Motoren-Werke (abbreviated hereafter as B. M. W.) in Munich. This company was well known during the war by the B. M. W. airplane engines and in peace time by the B. M. W. engines for cars, trucks and motorcycles. The standardization system, introduced by these two engineers in their Munich works three years ago, has proved out very well and now forms not only the foundation for the steel specifications of the Verein deutscher Motoren-Industrieller (German Society of Automotive Manufacturers), to be described later on, but also for that of other countries like Switzerland, Belgium, Sweden, etc. In pursuance of the new system, it is a serious fault to classify the steels for the automotive vehicles according to the purpose they are used for; the right way is a classification according to the properties of the steels. As the properties of steel depend in the first place on the percentage of carbon, and in the second place on the degree of alloy, the standardization has to follow these two directions.

By laying out the carbon contents as abscissæ and the alloys with other metals, like nickel, chromium, manganese, silicon, etc., as ordinates, generally every point of this system of co-ordinates will correspond to a steel of quite distinct chemical composition and strength properties. These principal properties can be changed extensively only by a heat treatment (annealing, hardening, forging, etc.). However, as the kind of heat treatment depends upon the carbon contents, it is sufficient to subdivide the carbon contents into intervals, within which the properties may be assumed

TABLE II.—COLORS AND STRIPES AND DESIGNATING MARKS

Percentage of Carbon Up to	Material	Basic Color	Class "a" Construction Steel	Non-alloyed Steel Class "b" Open-hearth Steel	Class "c" ;	Manganese Steel	Low-alloy Steel (d) Manganese Silicon Steel	Chromium-Silicon Steel	Vanadium Steel
0.15	ing steel	White	11a†	11b**	.....	21m	21m/s	21c/s	21v
0.16 to 0.25	Semi-refined universal case-hardening steel	Blue	12a†	12b**	.....	22m	22m/s	22c/s	22v
0.26 to 0.35	Refined water hardening (not for case-hardening)	Red*	13a†	13b**	.....	23m	23m/s	23c/s	23v
0.36 to 0.45	Refined oil-hardening (not for case-hardening)	Red	13a†	13b**	.....	23m	23m/s	23c/s	23v
0.50 to 0.60	Highly refined spring steel	Yellow	14a†	14b**	.....	24m	24m/s	24c/s	24v

*With narrow white stripe running lengthwise, indicating that the steel is already refined.

†Has basic color. **Basic color, half width only. †No color marking.

d Basic color and lavender, both running lengthwise.

to be practically limited to "above" and "below" and "technically uniform." Thus the steel works has the necessary full scope in the producing process and is allowed a sufficient tolerance. Leaving out of account the degree of alloy, the construction steels for automotive vehicles may be classified into four principal groups, according to their carbon contents, in the following manner:

1—Steel of about 0.05 to 0.15 per cent carbon, as

TABLE III.—B. M. W. SPECIFICATIONS (Strength figures translated)

Per Cent Carbon Character		0.05 to 0.15 Case - hardening Steel				0.16 to 0.25 Semi-refined Universal Case-hardening Steel					
	Condition	Class	Elastic Limit	Tensile Strength	Elongation % Minimum	Notching Toughness	Class	Elastic Limit	Tensile Strength	Elongation % Minimum	Notching Toughness
Construction Steel	1. Annealed	11a	32,700	52,600	30	11,400	12a	39,800	66,800	25	10,000
	2. Natural hardness		42,650	64,000	25	11,400		49,800	78,200	20	10,000
	3. Refined		57,000	85,300	20	11,400		64,000	99,500	13	10,000
	4. Hardened		32,700	52,600	25	8,530		39,800	66,800	20	7,110
Basic open-hearth steel	1. Annealed	11b	42,650	64,000	20	8,530	12b	49,800	78,200	15	7,110
	2. Natural hardness		57,000	85,300	15	8,530		64,000	99,500	10	7,110
	3. Refined		28,500	49,800	20	5,700		35,550	61,200	15	
	4. Hardened		35,550	57,000	15	5,700		49,800	78,200	10	
Commercial Quality	1. Annealed	11c	28,500	49,800	20	5,700	12c	35,550	61,200	15	
	2. Natural hardness		35,550	57,000	15	5,700		49,800	78,200	10	
	3. Refined		49,800	71,100	15	5,700		57,000	92,400	7	
	4. Hardened										
Explanation of Figures 1, 2, 3, 4	1. Annealed at about	*930 deg. Celsius; cool slowly					†900 deg. Celsius; cool slowly				
	2. Natural hardness	No heat treatment					No heat treatment				
	3. Refined	.....					Quench at about **850 deg. Celsius in oil or water; Reheat to 1630 deg. Celsius				
	4. Hardened at about	*930 deg. Celsius, in water					†900 deg. Celsius, in water or oil				
Tolerance			4,265 lb. per sq. in.					4,265 lb. per sq. in.			
		*1706 deg. Fahr.	†1652 deg. Fahr.	**1562 deg. Fahr.	†1166 deg. Fahr.	†1472 deg. Fahr.					

unrefined case hardening steel, for general purposes.

2—Steel of about 0.16 to 0.25 per cent carbon, as refined and case hardening steel for universal uses.

3—Steel of about 0.26 to 0.45 per cent carbon, as pure refined steel, with a further classification of 0.26 to 0.35 per cent carbon for hardening in water and of 0.36 to 0.45 per cent carbon for hardening in oil.

4—Steel of about 0.50 to 0.60 or 0.70 per cent carbon, as highly refined spring steel.

TABLE IV.—SPECIFICATIONS FOR NON-ALLOY STEELS, ADOPTED (All values of strength have been

Class % Carbon	Quality	Condition	10 0.0 to 0.10				11 0.10 to 0.20			
			Case-hardening		Soft Steel		Case-hardening		Steel (not refined)	
			Elastic Limit	Tensile Strength	Elonga- tion in % Minimum Value	Notching Toughness Minimum Value	Elastic Limit	Tensile Strength	Elonga- tion in % Minimum Value	Notching Toughness Minimum Value
a	1. Annealed		32,700	45,500	38	21,330	35,550	59,700	27	11,400
	2. Sufficiently hard for rolling		35,550	49,800	34	17,000	45,500	71,100	23	10,000
	3. Refined		.....	.....	.....	.....	.....	.....	.....	.....
	4. Hardened		49,800	71,100	25	14,220	64,000	93,800	15	8,530
b	1. Annealed		32,700	45,500	32	17,000	35,550	59,700	22	8,530
	2. Hard for rolling		35,550	49,800	28	12,800	45,500	71,100	18	7,110
	3. Refined		.....	.....	.....	.....	.....	.....	.....	.....
	4. Hardened		49,800	71,100	19	10,000	64,000	93,800	10	5,700
c	Miscellaneous class for untested minor material. Without prescription of quality									
Explanation of figures 1, 2, 3, 4	1. Annealed at about		*950 deg. Celsius; cool slowly				†920 deg. Celsius; cool slowly			
	2. Hard for rolling						Without special			
	3. Refined									
	4. Hardened at about		*950 deg. Celsius in water				†920 deg. Celsius in water			
Tolerance			±4,265 lb. per sq. in.				±4,265 lb. per sq. in.			
			*1742 deg. Fahr. †1688 deg. Fahr. **1616 deg. Fahr. †1166 deg. Fahr. †1544 deg. Fahr. †1472 deg. Fahr.							

TO DISTINGUISH STEELS OF VARYING CHARACTERISTICS

		Alloy Steel (e)				High-alloy Steel (f)			
		Nickel Steel		Nickel-chromium Steel (g)		Nickel Steel		Manganese Steel	
		About	Under	3% Chromium over	3% Chromium under	Steel (g) Over 1.5%	30%	25%	5 to 6%
Over	Under								
1% 3%	2%			1%	1%				
31a	31b	31c	41a	41b	51	61	71a	71b	71c
32a	32b	32c	42a	42b	52	62	72a	72b	72c
33a	33b	33c	43a	43b	53	63	73a	73b	73c
34a	34b	34c	44a	44b	54	64	74a	74b	74c

Basic color and green (except chromium steel, which is basic and orange), both running lengthwise.

Basic color and drab, both running lengthwise.

With narrow yellow stripe running lengthwise through the green band, indicating that the steel is already hardened.

These four principal groups of carbon steel are furthermore to be distinguished in their mechanical (strength) properties according to their quality, depending upon the process of production. The first quality is the construction steel (class a). The second quality is the standard basic Siemens-Martin or open-hearth steel (class b). The third quality is the commercial steel, with the least strength (class c).

for low alloy steel, the cardinal number 20; for nickel-alloy steel, the cardinal number 30; for nickel-chromium-alloy steel, the cardinal number 40; for nickel-tungsten-alloy steel, the cardinal number 50; for higher chromium-alloy steel (more than 1.5 per cent), the cardinal number 60; for high alloy steel, the cardinal numbers 70 and 80.

In accordance with this, Table I was arranged. The

practical application of Table I is as follows: Of new steel coming to hand in the factory, in the first place the carbon content is determined and, according to this percentage, the definite annealing and hardening temperatures are prescribed. In this manner figures are obtained that are produced under the same conditions as those in Table I and, therefore, may be compared with them. When the classification has been done, the corresponding steel is painted lengthwise with a distinct color; Table II shows the different colors used for automotive steels with reference to the specification of Table I. It may be added that

FOR STEEL WITHOUT ALLOYS
into Lb. per Sq. In.)

0.26 to 0.45 Refined Steel (Not for case-hardening)				0.50 to 0.60 Highly Refined Spring Steel			
Class	Elastic Limit	Tensile Strength	Notching Toughness	Class	Elastic Limit	Tensile Strength	Notching Toughness
	46,900	82,500	18		59,700	99,500	15
13a	71,100	106,600	15	14a	92,400	128,000	10
	99,500	128,000	10		142,200	185,000	6
	46,900	82,500	15		59,700	99,500	12
13b	71,100	106,600	10	14b	92,400	128,000	8
	99,500	128,000	7		128,000	170,600	4
	42,650	71,100	15		82,600	92,400	12
13c	66,800	99,500	10	14c	78,200	114,000	8
	85,300	114,000	7		114,000	142,200	8

**850 deg. Celsius; cool slowly
No heat treatment
Quench at about **850 deg. Celsius in oil or water; Reheat to 1630 deg. Celsius
**850 deg. Celsius in water or oil
7,110 lb. per sq. in.

\$800 deg. Celsius
No heat treatment
Quench at about \$800 deg. Celsius in oil; Reheat to 1630 deg. Celsius
\$800 deg. Celsius in oil
11,400 lb. per sq. in.

The four principal groups are characterized in the accompanying tables by the "units" figure of a number of two figures, thus:

The figure 1 means an average carbon content of 0.1 per cent.

The figure 2 means an average carbon content of 0.2 per cent.

The figure 3 means an average carbon content of 0.3 per cent.

the specification in Table I, covering tool steels, represents only a preliminary work that may be changed later in some particulars.

Table I forms the main specification, comprising all kinds of steels. But for practical use an enlargement and addition of some new items seemed to be valuable. Walter Pessl, head of the steel section of the German Society of Automotive Manufacturers, has carried out this enlargement for the non-alloy steels of Table I,

and Table III represents the new specification, covering only non-alloy steels. As a basis, an average chemical composition was taken, as follows: Manganese, not over 0.8 per cent; silicon, not over 0.3 per cent; phosphorus, not over 0.05 per cent; sulphur, not over 0.05 per cent. The strength figures of the steel as delivered were supplemented by the strength figures for the steel in the annealed and hardened states.

In addition to the usual statement of the tensile strength, the elastic limit and the notching toughness (strength in

BY THE GERMAN SOCIETY OF AUTOMOTIVE MANUFACTURERS
translated into Lb. per Sq. In.)

12 0.20 to 0.35 Semi-refined Steel				13 0.35 to 0.50 Refined Steel (not for case-hardening)				15 0.50 to 0.70 Highly Refined Steel			
Elastic Limit	Tensile Strength	Elongation in % Minimum Value	Notching Toughness Minimum Value	Elastic Limit	Tensile Strength	Elongation in % Minimum Value	Notching Toughness Minimum Value	Elastic Limit	Tensile Strength	Elongation in % Minimum Value	Notching Toughness Minimum Value
42,650	71,100	20	11,400	49,800	85,300	16	8,530	71,100	114,000	14	5,700
54,000	82,500	16	10,000	64,000	99,500	12	7,110	99,500	142,000	10	4,265
71,100	99,500	15	14,220	92,400	120,900	15	11,400	128,000	156,500	8	8,530
85,300	114,000	10	7,110	120,900	156,500	7	4,265	156,500	199,000	5	2,840
42,650	71,100	16	8,530	49,800	85,300	13	7,110	71,100	114,000	12	4,265
54,000	82,500	12	7,110	64,000	99,500	9	5,700	99,500	142,000	8	2,840
71,100	99,500	11	10,000	92,400	120,900	12	8,530	128,000	156,500	6	5,700
85,300	114,000	7	4,265	120,900	156,500	5	2,840	156,500	199,000	3	1,420

**850 deg. Celsius; cool slowly
heat treatment
Quench at about **850 deg. Celsius in oil or water, reheat to 1630 deg. Celsius
**850 deg. Celsius in oil or water
±7,110 lb. per sq. in.

\$840 deg. Celsius; cool slowly
Quench at about \$840 deg. Celsius in oil or water, reheat to 1630 deg. Celsius
\$840 deg. Celsius in oil
±7,110 lb. per sq. in.

\$\$900 deg. Celsius; cool slowly
Quench at about \$\$900 deg. Celsius in oil or water, reheat to 1630 deg. Celsius
\$\$900 deg. Celsius in oil
±11,400 lb. per sq. in.

kilograms per square centimeter for bar of 10 x 10 millimeters section and round notching) has been added, because these data are far more valuable for the designer than the tensile strength only. Of course, it was necessary, too, to standardize the terms "annealing, hardening and refining," because different temperatures of annealing, hardening and refining result in correspondingly different strength properties. These terms were fixed as follows:

Class 11—(non-refined case hardening steel):

Annealing: at about 930 deg. Celsius (1706 deg. Fahr.); cool slowly.

Hardening: at about 930 deg. Celsius; quench in water.

Class 12—(universal case hardening steel):

Annealing: at about 900 deg. Celsius (1652 deg. Fahr.); cool slowly.

Refining: at about 900 deg. Celsius; quench in oil or water and reheat to about 630 deg. Celsius (1166 deg. Fahr.).

Hardening: at about 900 deg. Celsius in water or oil.

Class 13—(refined steel):

may be valuable, because all strength figures there given relate only to a direction parallel to the bar fiber, and a further addition covering material that is re-forged. This addition will be necessary, because in bevel wheels and spur gears, that are not re-forged, but made of the solid piece, the teeth mostly are inclined at 45 deg. to the fiber or are perpendicular to it.

The alloy steel specification in Table I is to be enlarged and completed in the same manner as for Table III for non-alloy steels. But this work requires considerable time and labor and has not yet been finished.

As previously mentioned, the German Society of Automotive Manufacturers has adopted the steel specification tables of the Bayerische Motoren-Werke (B. M. W.), described above, as the foundation for the steel specification recommended by the society to its members.

Table IV shows this specification, for non-alloy steels, that is similar to Table III of the B. M. W.; only it has five groups of carbon contents and two classes of quality, *a* and *b*, while the third class *c* represents a miscellaneous class for minor material. The descrip-

TABLE V.—SWISS STEEL SPECIFICATION FOR NON-ALLOY STEELS
(All values of strength have been translated into Lb. per Sq. In.)

Symbol	Chemical Composition in 1/100%				Condition	Mechanical Properties							Remarks
	C	Mn	P	S		Elastic Limit	Tensile Strength	Elongation in%		Notching Toughness			
								<i>l</i> =10 <i>d</i>	<i>l</i> =5 <i>d</i>	Test Bar 20	Test Bar 10		
C1 _{gs}	Not over 6	Not over 10	Max. 2	Max. 2	Annealed	25,600	42,650 to	45,500	30	40	.....	.....	Very soft
C1 _n	5 to 15	30 to 50	7	6	Annealed	31,300	54,000 to	62,500	22	27	.....	.....
C1	5 to 15	30 to 50	4	3	Annealed	31,300	54,000 to	62,500	24	30	28,450	.....	For case- hardening
C1 _s	6 to 12	40 to 50	2	2	Annealed	31,300	54,000 to	62,500	25	30	37,000	.....
					Case-hardened and hardened in water	42,650	64,000 to	78,100	18	22	28,450	.....	Medium Soft
C2 _n	15 to 25	40 to 60	7	6	Annealed	37,000	62,500 to	71,100	20	24	.....	.....
C2	15 to 25	40 to 60	4	3	Annealed	37,000	62,500 to	71,100	22	26	25,600	.....	For case- hardening
C2 _s	15 to 20	50 to 70	2	2	Annealed	39,800	62,500 to	71,100	22	28	34,100	.....
					Case-hardened and hardened in water	57,000	99,500 to	128,000	8	10	21,330	.....	Medium hard
C3 _n	25 to 40	50 to 70	7	6	Annealed	42,650	71,100 to	85,300	16	20	.....	.....
C3	25 to 40	50 to 70	4	3	Annealed	42,650	71,100 to	85,300	20	25	20,000	.....
					Refined	57,000	85,300 to	99,500	18	20	22,750	.....
					Refined	71,100	99,500 to	114,000	14	16	17,000	.....
					Refined	85,300	114,000 to	128,000	10	12	11,400	.....
					Refined	99,500	128,000 to	142,200	8	10	7,110	.....	Hard
C4 _n	40 to 50	50 to 70	7	6	Annealed	48,350	85,300 to	99,500	12	15	.....	.....
C4	40 to 50	50 to 70	4	3	Annealed	48,350	85,300 to	99,500	14	18	14,220	.....
					Refined	71,100	99,500 to	114,000	12	15	14,220	.....
					Refined	85,300	114,000 to	128,000	10	12	11,400	.....	Very hard
C5 _n	50 to 60	60 to 80	7	6	Annealed	57,000	99,500 to	114,000	8	10	.....	.....
C5	50 to 60	60 to 80	4	3	Annealed	57,000	99,500 to	114,000	12	14	10,000	.....
					Refined	71,100	99,500 to	114,000	14	16	14,220	.....
					Refined	85,300	114,000 to	128,000	10	12	8,530	.....

Annealing: at about 850 deg. Celsius (1562 deg. Fahr.); cool slowly.

Refining: about 850 deg. Celsius; quench in oil or water and reheat to about 630 deg. Celsius.

Hardening: at about 850 deg. Celsius in water or oil.

Class 14—(highly refined steel):

Annealing: at about 800 deg. Celsius (1472 deg. Fahr.); cool slowly.

Refining: at about 800 deg. Celsius; quench in oil and reheat at 630 deg. Celsius.

Hardening: at about 800 deg. Celsius in oil.

According to the prescription, the steels were treated corresponding to their carbon contents, the strength values were determined and somewhat modified, so that the separate sub-groups of a class may be distinguished sufficiently from each other by different values of the elastic limit, tensile strength and elongation. This small modification was chosen in such a manner that, between the sub-groups *a* and *b* in Table I, only the elongation among the principal features appears changed (with constant elastic limit and tensile strength); while between the sub-groups *b* and *c*, with constant elongation, the elastic limit and tensile strength are changing. Thus the material of the sub-group *a*, that is used in the first place for bevel gears, crankshafts and other highly stressed parts of the motor car, is distinguished definitely from the material of the sub-groups *b* and *c*.

Perhaps an addition to Table III, covering the strength figures at right angles to the fibers of a bar,

tions for annealing, hardening and refining are somewhat modified, too.

The Automotive Manufacturers' Association of Switzerland, also, has used the table of the B. M. W. as the foundation for its steel specification. Table V shows the Swiss specification for non-alloy steels, which has been adopted by Belgium and Sweden, too. Like the former tables, it refers neither to the production process nor to the application purpose of the steel, but is based only on its chemical composition and mechanical properties.

Every steel is marked by a symbol which contains the alloy components of the corresponding steel (if alloy steel at all) expressed by the international designations of the chemical elements. In the symbol these designations are arranged in the following order: Carbon = *C*, nickel = *Ni*, chromium = *Cr*, manganese = *Mn*, silicon = *Si*, vanadium = *V*, tungsten (wolfram) = *W*, molybdenum = *Mo*. After each designation of the alloy component stands its percentage figure multiplied by 10; for instance, *Cr* 10 means 1 per cent of chromium. If the percentage of the alloy component is less than 0.1, and the figure of percentage consequently smaller than the figure 1, then it will be expressed by a fraction.

The designation *C* for carbon is used only for the carbon steels, but not for the alloy steels; however, the percentage figure of carbon remains, and begins the symbol of each alloy steel. For example: a carbon steel with an average of 0.2 per cent carbon is marked

with C2. A chromium-nickel steel with an average of 0.1 per cent carbon, 4 per cent nickel and 0.8 per cent chromium is marked with 1 Ni 40 Cr 8. The letter *n* (normal purity) set behind the symbol means an admissible maximum percentage of 0.07 per cent phosphorus and 0.06 per cent sulphur. If neither letter *n* nor *s* stands behind the symbol, then the percentage of phosphorus may not exceed 0.04 per cent, nor that of sulphur 0.03 per cent. The letter *s* (superior purity), set behind the symbol, means an admissible maximum phosphorus (and sulphur) percentage of 0.02 per cent each.

The Swiss specification table contains data covering the following mechanical properties: the minimum values of the elastic limit in kilograms per square millimeter, the minimum and maximum values of tensile strength in kilograms per square millimeter, the minimum values of elongation for measuring length $l = 10 d$

or $11.3 \sqrt{F}$ and $l = 5 d$ or $5.65 \sqrt{F}$, expressed in percentage of the original measuring length, in which *F* means the original section of the test bar. Finally, the minimum values of the notching strength in kilograms per square centimeter. The test bars have the following dimensions:

Test bar 20: $L = 160$ mm. (6.3 in.); $b = 20$ mm. (0.79 in.); $t =$ notching depth $= 5$ mm. (0.2 in.); $r = 2$ mm. (0.08 in.); $l = 120$ mm. (4.7 in.).

Test bar 10: $L = 80$ mm. (3.15 in.); $b = 10$ mm. (0.394 in.); $t = 2.5$ mm. (0.1 in.); $r = 1$ mm. (0.039 in.); $l = 70$ mm. (2.76 in.).

The notch of the test bar shall be perpendicular to the direction of fibers.

Other Swiss tables for alloy steels are to be prepared, but this work is being done in close conformity with the specifications of the B. M. W. German Table I, above.

OXYGEN IN METALLURGY

Rôle of Air, Rich in Oxygen, in the Blast Furnace, Bessemer and Open-Hearth Processes

At a joint session of the Faraday Society and the British Cold Storage and Ice Association recently, Cosmo Johns, of Sheffield, made an interesting contribution on the use of oxygen in metallurgical processes.

He said that most of the useful metals in present-day practice are extracted from their ores and refined for industrial use by processes which involve the use of atmospheric air for the combustion of carbonaceous matter, silicon, phosphorus or sulphur, to provide the heat required. These processes have become standardized to a large extent, and are based on the assumption of the invariableness of the oxygen content of the atmosphere.

Obviously the oxygen enrichment of the air used would alter the conditions under which those metallurgical processes which depend on oxidation of some fuel for the heat required are carried out, and though it is difficult to predict what would actually be the effect of such altered conditions, yet enough is known to enable us to say that revolutionary changes in metallurgical practice would result. The processes now employed, and the types of plant used, are the result of gradual evolution of industrial practice. Our knowledge of the reactions that occur are imperfect and almost entirely restricted to our knowledge of what occurs when ordinary air is used. But though it may be difficult to predict the actual changes in practice that would result, it is comparatively easy to review the possibilities. It is important to note, however, that what is contemplated is not the use of pure oxygen, but the availability of a mixture with 30 to 40 per cent of oxygen, or even less.

In the Blast Furnace

The modern blast furnace plant would obviously undergo a startling change in its design and arrangement when it had no longer to handle the present huge volumes of dust-laden heated combustible gases to effect difficult heat exchanges with the incoming air to secure fuel economy. The hot blast stoves would probably disappear, or be much reduced in size. The furnace itself would be reduced in height, and the whole plant, when the changes had been completed, would bear but little resemblance to the equipment found necessary to-day for the production of pig iron.

In the Bessemer Converter

The Bessemer converter, whether acid or basic, has been evolved on the assumption of an invariable oxygen content of the air blown in. Given the possibility of varying and controlling the oxygen ratio in the air employed, we should find the character of the process completely changed. In the acid process the order in which carbon and silicon are removed depends on the temperature. In the basic process it is almost certain that by controlling the temperature it would be possible to oxidize the phosphorus before all the carbon had been

removed, and thus the injurious after-blow would be avoided. This temperature control could be effected if the oxygen content of the air blown in could be varied.

In the Open-Hearth Furnace

The regenerative open-hearth furnace is costly, complicated, and inefficient from the thermal standpoint. If oxygen-enriched air could be employed for the production of the fuel gas, and for its subsequent combustion in the hearth of the furnace, it would be possible to effect a startling and beneficial alteration in the plant. The uni-flow furnace would become a possibility, and there would be a very desirable simplification in the design of the furnace. A neutral or oxidizing flame would be at the command of the operator, while the melting and refining operations would be accelerated. The waste gas of the furnace would be much richer in CO₂, and, with added oxygen, rich air would be ideal for blowing into the gas producer, thus enabling a fuel gas rich in CO to be supplied to the furnace.

Pure Oxygen Not Needed

It is important to note that it is not pure oxygen that is required. It would be amply sufficient if the oxygen content could be varied between the range of 20 and 40 per cent. What is required is not pure oxygen in steel flasks, but enriched air in hundreds of tons.

Owing to the slight difference in density of oxygen and nitrogen it would appear that centrifugal methods for their separation are not very hopeful. Can any refrigerating system be devised which will give oxygen enriched at a commercial price? Any such refrigerating system should be able to use, as the source of the energy it requires, the sensible or potential heat of the products of the metallurgical process where it is employed, if carbon be the fuel used in the process. If a suitable cycle can be discovered for effecting the partial separation of the two mixed gases, for complete separation is not required, then a vast field is available for the use of oxygen-enriched air in metallurgical operations.

[In THE IRON AGE, Nov. 2, p. 1179, there is a brief article along the same lines which discusses the new investigations which the U. S. Bureau of Mines is inaugurating with a view to securing cheaper oxygen and to ascertaining the practicability of its use in metallurgy.]

The Pittsburgh Steel Co. reports sales to the value of \$5,381,130 in the three months ended Sept. 30, which, after setting aside the sum estimated to meet income and profits taxes, resulted in a net loss of \$9,687. In the same period last year, sales of \$3,428,790 brought the company a net profit after allowance for taxes of \$13,921.

Accidents at beehive ovens are referred to as follows by the U. S. Bureau of Mines. On the basis of production the fatal and non-fatal accident rate was 61.3 per million tons of output in 1921, as against 51.0 in 1920, 72.2 in 1919, and 71.3 in 1918. The 1921 beehive output was smaller than for any year since 1885.

Reincarnation of a Firearms Business

Resumption on a Production Basis, Within a Few Months, of the Marlin Establishment—Good-Will of Former Employees a Factor

BY L. S. LOVE

THE Marlin arms business was founded at New Haven, Conn., in 1870 by John M. Marlin, who had been trained in the manufacture of firearms in the Colt plant at Hartford. At the time the Marlin company was organized the entire capital was \$400. This company at first manufactured pistols, revolvers and later the famous Ballard target rifles. In 1880 the first model Marlin repeating rifle was placed on the market and all other models were then dropped from production, which was centered on the manufacture of repeating arms. Later the side ejecting firearm was developed by this company.

In 1915 the business was sold to other interests, later known as the Marlin Rockwell Corporation. With the plant in New Haven as its foundation, this corporation undertook the manufacture of machine guns during the war. At the time the United States entered the war there were about 1300 machine guns of four varieties owned by the War Department. At that time the Marlin organization, making machine guns for the Allies, had a capacity of about 200 per day. This capacity was increased to about 1000 machine guns per day at the time of the armistice.

When the war was ended the Marlin firearms business was not immediately resumed, principally on account of high production costs. Accordingly the plant was closed and all tools, jigs, fixtures, etc., were packed away in storage.

Owing to labor conditions it was deemed inadvisable to resume operations until August, 1921, when a new company known as the Marlin Firearms Corporation was formed. In the meantime, the Marlin organization had dispersed, many of the men entering other lines of business.

The new company was started by two men only, one of them the former sales manager of the old Marlin business. The corporation acquired the plant, patents, good-will, tools, fixtures, gages, machinery, etc., of both the Marlin firearms business and the Hopkins & Allen arms business, of Norwich, Conn.

The first step was to arrange for Marlin organization foremen to return to the Marlin plant. Practically all of these men had worked in the plant for years, ranging in service from 15 to 38 years, and they were glad of the opportunity to return to their old positions. The services of some of these men were highly valuable, as a number of them had supervised the packing away of the tools and gages. They were all at once put to work assorting and cataloging the tools for convenient handling. At the same time the engineering department was at work improving the design of some models.

As soon as possible after the commencement of operations, the tool, die and gage department was set up and a force of tool makers put to work, making tools for redesigned models, repairing old tools which needed it and replacing those which had been lost or mislaid.

The next step was to set up the manufacturing department. As the original Marlin plant grew, the various departments were laid out, as is usually the case, wherever space was available. In the resumption of operations the reorganization of all departments permitted the grouping together of those parts of the work of manufacture which were closely associated and the routing of the work through the plant so that the parts

in process at no time double back upon their trail, thus permitting the most economical manufacturing layout. Loyalty of former salesmen was also exhibited in that the new corporation was able to recall many former representatives to its service.

The remarkable strides made in getting production into working order is no doubt largely attributable to the systematized method of routing materials through the shop and checking each piece and each operation.

Each job is originated in the production or planning office, a different colored card being used to indicate different models. The card is perforated in the middle, the upper half showing production order number, the piece number, machine operation number, etc. The lower half is a move ticket for the piece to the next operation, this part of the ticket showing the number of pieces delivered to machine, number lost, number spoiled and number passed by inspector. These cards when issued by the production department go to the shop which is to perform the operation, where the foreman inserts the number of the machine on which it is to be handled and places the card in a rack provided for the purpose. This rack consists of two parts bearing the numbers of machines in the department; the inactive part of the rack shows jobs waiting for machines and the active part of the rack shows jobs in process. When there is no work for any particular machine, a green card is inserted in the rack opposite the number of that machine. A blue ticket in the rack opposite any machine number indicates that the machine is to be set up and tooled for a special rush job and held, regardless of any other job waiting for the machine. Operators' production tickets, which are used in conjunction with the operation ticket, are carried in the racks bearing the operators' clock numbers.

When the job is completed the lower half of the card goes to the next department to notify that foreman that the work is coming through to his department. The work is handled in counting trays to facilitate checking of finished pieces. After the move ticket has been checked by the next department, it is returned to be clipped to the operation half of the ticket and forwarded to the production office and accounting department.

A similarly designed ticket is used for stores requisition. This ticket is printed in red ink and is used by the assembly department. A special delivery ticket, also printed in red, is used for making up shortages of parts required by the assembly department.

All work moving from one department to another must be signed by the foreman of the department receiving the goods. Parts returned to stores must be signed for by the storekeeper. The use of these cards permits a complete record to be kept in the production or planning office of all work as it proceeds through the shop. Note is made at the time a job starts, when it moves to the next department, etc., so that at all times the production office knows accurately the status of work in the shop.

When a job is nearing completion on one operation, notice is sent to the tool crib to prepare tools, fixtures, etc., for the next operation, so that any loss of time due to waiting for tools is avoided.

Key cards are used to maintain a constant check

THE HANNA FIRBRIDGE CO. Form No. 100A
MACHINE OPERATION
 Produced Under No. _____
 Date _____ Operation No. _____ Month _____ Day _____ Year _____
 Quantity _____ Machine No. _____ Inspection Card No. _____
 Description of Time _____
 ①
 WHEN WANTED _____ Amount _____
 WHEN PLACING DEPARTMENT WHEN COMPLETED _____
 OPERATION _____ Month _____ Day _____ Year _____
 WHEN PLACING DEPARTMENT WHEN COMPLETED _____

THE HANNA FIRBRIDGE CO. Form No. 100A
DAY WORK PRODUCTION TICKET
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ②
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
NON-PRODUCTIVE DAY WORK TICKET
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 NATURE OF WORK _____
 ③
 RATE PER HR. _____
 CUMULATIVE _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
MOVE FROM
 Produced Under No. _____
 Date _____ Operation No. _____ Month _____ Day _____ Year _____
 Quantity _____ Machine No. _____ Inspection Card No. _____
 Description of Time _____
 ④
 WHEN WANTED _____ Amount _____
 WHEN PLACING DEPARTMENT WHEN COMPLETED _____
 OPERATION _____ Month _____ Day _____ Year _____
 WHEN PLACING DEPARTMENT WHEN COMPLETED _____

THE HANNA FIRBRIDGE CO. Form No. 100A
SPECIAL DELIVERY MOVE TO
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ⑤
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
PIECE WORK PRODUCTION TICKET
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ⑥
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
STORES OF ISSUE
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ⑦
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
UNITS KEY CARD
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ⑧
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
UNIT ASSEMBLY INSTRUCTION CARD
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ⑨
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
SECONDARY UNITS KEY CARD
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ⑩
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

THE HANNA FIRBRIDGE CO. Form No. 100A
KEY CARD
 Produced Under No. _____
 Date _____ Employee's Name _____
 Close No. _____ Finished _____ Date _____
 Part No. _____
 TOTAL QUANTITY ON ORDER _____
 OPERATION NO. _____ MACHINE NO. _____
 TOTAL FINISHED SCRAP _____ RATE PER HR. _____
 DESCRIPTION OF OPERATION _____
 ⑪
 FINISHED TODAY _____
 O. N. ST. _____ FOREMAN _____

- 1—Perforated card issued for each operation.
- 2—Time card used in conjunction with operation card.
- 3—Time card for repair and other non-productive work.
- 4—Card used for rush or replacement jobs.
- 5—Time card for piece work.
- 6—Card used by assembly department to draw parts from stores.
- 7—Detailed record of parts in stock.
- 7a—Reverse side of No. 7.
- 8—Record of partly assembled parts.
- 9—Final assembly record.

on finished parts in stock. These cards cover both units and what are known as secondary units which are composed of single units already assembled, before going to the final assembly. The usual process of soft and hard assembly is practiced in this shop.

In the short time that the new organization has been working, production has been boosted to the point where it is almost keeping step with orders as they come in, although the shop is still several thousand guns behind actual orders.

Briquets of Flue Dust

The principle of briquetting as a means of flue dust disposal has been adopted by the M. A. Hanna Furnace Co., and a plant installed at its Buffalo operation has been accepted by that company. The officials of the Hanna company are expected shortly to make similar installations at their other blast furnaces.

The keynote of the new plant is its automatic and simple operation. Hitherto, rotary presses have been considered impossible from the point of view of briquet-

ting ores and flue dust, largely because the pressures realized were insufficient to make coherent and strong briquettes. Such briquetting plants as have been installed in the country have used either the drop presses followed by tunnel furnace treatment, or a powerful toggle press followed by a period of seasoning. The products were large briquets, costly to manufacture and costly to handle. The new briquet, as turned out at Buffalo, is pillow shaped, small—weighing 5 oz. Passing directly from the press to a seasoning belt it is ready at the end of an hour's travel for fairly rough handling.

The cost, both for plant installation and for briquet manufacture, is relatively small. The briquets are in easily reducible form and are not magnetic.

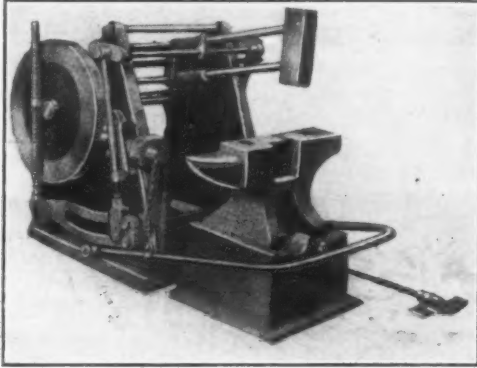
The Frazier-Sheal Co., Cleveland, engineers and constructors, have removed their offices from the Illuminating Building, to the B. F. Keith Building, Euclid and East Seventeenth Street.

The Otis Steel Co., Cleveland, has placed an order with the M. W. Kellogg Co., Jersey City, for six brick stacks for its new open-hearth plant.

General Utility Blacksmith's Hammer

A general utility blacksmith's hammer designed to work upon an ordinary anvil and intended as a one-man tool, dispensing with the services of strikers, has been placed on the market by the Blacker Engineering Co., Inc., Grand Central Terminal, New York. Special tools or dies need not be employed.

The general construction of the hammer may be noted from the accompanying illustration. It is rated to work 2½ in. and larger material, and only 1 hp. is required for operation. The blow struck is said to be about four times as heavy as that of a man striking,



General Utility Blacksmith's Hammer Intended to Eliminate Necessity of Striker. The hammer has lateral movement and stroke is adjustable

and the machine attains the rate of as much as 140 blows per min. Because of the parallel arms the work is struck with a straight blow, which is pointed out as an advantage to the blacksmith who works alone with his ordinary tools and without clamps, swages, etc.

The lateral traverse motion of the hammer is a feature. It permits quickly traveling the head along the face of the anvil to any point, and bringing it over the holes for swaging, punching, heading or similar work. The motion is controlled by the winged foot lever shown at the right of the anvil, and can be operated without stopping the hammer. Light or heavy blows may be struck as desired, the weight of the blow varying according to the amount of depression of the foot treadle extending around the anvil. The usual distance between the face of the head and the anvil is 8½ in. The stroke is quickly adjustable to suit the work in hand.

Anvil and block of special design, having a planed base and a stand with adjusting screw as shown, can be provided. The adjustment permits bringing the anvil backward or forward as required. The pulleys are 15 in. in diameter, 2¾ in. face. The motor is set in the frame of the machine, and geared direct, making a self-contained unit. The weight of the hammer alone is 1300 lb., the special anvil 560 lb. and the weight of the stand 336 lb. The machine was originally brought out in England a few years ago, and within the last few years in France, also.

Drop in Manufacture of Horseshoes

Figures of the Census Bureau show a considerable falling off between 1919 and 1921 in the manufacture of horseshoes. The number of establishments decreased from 20 to 12. The number of persons engaged dropped from 919 to 306, and of wage earners from 744 to 207. The value of the products fell from \$3,367,001 to \$1,931,812, or 42.6 per cent. Connecticut produced in its three establishments, 54.1 per cent of the total value of 1921 products.

The United States Civil Service Commission will receive applications until Dec. 5 to fill positions of mechanical inspector at the Naval Station, Pearl Harbor, Hawaii. The pay offered is \$7.20 a day with an additional allowance of 96 cents a day while employed at the station. A degree in mechanical or electrical engineering and at least three years of certain specified experience are required.

Tool Grinder for Single-Phase Current

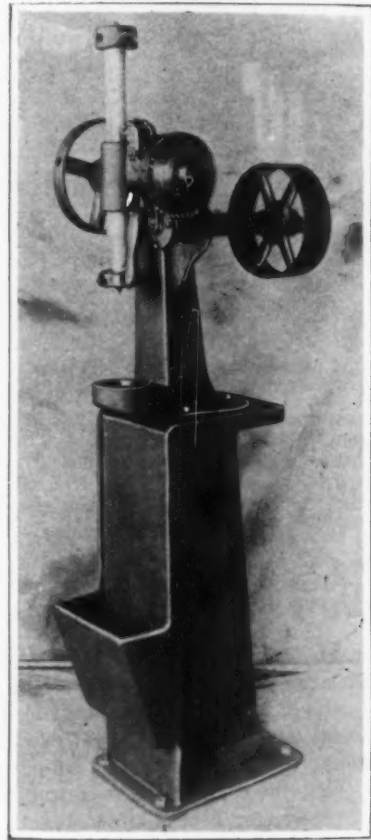
A model No. 75 electric-driven tool grinder, similar to the No. 76 which was described in THE IRON AGE of June 22, has been brought out by Forbes & Myers, Worcester, Mass. The new model is designed for single-phase current and the motor has all the windings on the back side. The 6-in. grinding wheels are mounted on the motor shaft and the front of the grinding wheels can be worn away before they are even with the front of the motor. Other details are the same as in the model previously described. The machine can be equipped with cord and plug for operation from an ordinary lamp socket.

Vertical Broaching Press for Small Work

The power bench broach press shown in the accompanying illustration has been placed on the market by the American Broach & Machine Co., Ann Arbor, Mich., to meet a demand for a small vertical machine for broaching round holes, squares, hexagons and small keyways. It will take work up to 6 in. in diameter.

The maximum stroke is 14 in. and the pressure developed approximately 2 tons. The table is bored 2½ in. in diameter central with the ram. The driving pulley is 10 in. in diameter, 3 in. face and the power is transmitted through the steel worm and bronze worm gear shown. The machine is fitted with an automatic stop and the movement of the ram is controlled by a positive jaw clutch, which is of steel and hardened. The return movement of the ram is by means of a counterweight.

The press can be operated as a hand machine, the



Vertical Press for Broaching Round Holes, Squares, Hexagons and Small Keyways

hand wheel at the left being equipped with hollow spokes, as shown, to receive a leverage bar. The oil receptacle mounted on the pedestal may be connected with an oil pump when required. The distance from the top of the work table to the floor is 36 in. The machine weighs approximately 350 lb.

Improvements recently completed at the Blandburg, Pa., plant, Harbison-Walker Refractories Co., Pittsburgh, have brought the daily capacity of that plant from 40,000 to 60,000 9-in. equivalent fire clay brick.

Bases of Modern Blast Furnace Practice*

Methods of Producing the Highest Combination of Quality, Economy and Quantity—Uniformity in Raw Materials—Lines of Furnaces

BY A. K. REESE

THERE are many factors entering into this subject, each of which is more or less dependent upon the others. They may be divided under four major headings, which may be called the prime factors in modern blast furnace practice. That practice is distinctly the result of evolutionary progress, the modern phase dating from 1894, when James Gayley introduced the low bosh at Braddock, Pa., up to the present era of large hearth diameter and steep bosh angle.

There are three principal objects in all blast furnace practice, ranking in importance in the following order—quality, economy and quantity. The first is essential; the second is commercially of great importance; the third is highly desirable, particularly in its bearing upon the second. No. 1 may be obtained independently of the other two. No. 2 may be obtained, to a degree, independently of No. 3. No. 3 is, to a degree, subject to Nos. 1 and 2. In all blast furnaces one of these objects has been the limiting factor in the attainment of the others. The object sought through the application of so-called modern practice may be described thus:

Consistent with quality, to produce the greatest possible economical quantity and, as any material increase in quantity has a direct and favorable bearing upon economy, this description of the object of modern blast furnace practice may be condensed to—the attainment of the greatest possible quantity consistent with quality.

The degree to which this object has been attained in certain localities, in comparatively recent years, resulting in normal economical outputs of from 400 tons to 600 tons per 24 hr., is well known, and demonstrates the great commercial advantage to be obtained by the adoption of the principles and methods by which it has been attained, in those other localities which up to the present have not yet fully adopted them.

There may be, and doubtless are, some makers who are still of opinion that with their particular materials the principles and methods of so-called modern blast furnace practice are not applicable. It is the author's firm conviction that those principles and methods are adaptable to any iron-bearing materials workable in a blast furnace, subject, of course, to suitable fuel and flux being obtainable within even a wide degree of quality, and subject, likewise, to a minimum degree of variation in that quality for any individual operation. He feels convinced that their adoption will lead to so great an advantage as to constitute almost a revolution in the pig iron industry in those localities where they have not hitherto been applied.

The four prime factors above referred to are:

- I. Preparation of Materials.
- II. Furnace Design.
- III. Auxiliary Equipment.†
- IV. Method of Operation.

I.—Preparation of Materials

That the mechanical and physical conditions of the materials charged into a blast furnace have a most important bearing upon its successful and satisfactory operation, affecting both its operative conditions and the economy of the results obtained, is a fact which no furnace operator is likely to dispute; but while it is true of any furnace, it is particularly true in its bear-

ing upon the operation of the modern blast furnace. One essential condition of satisfactory operation is that there shall be as nearly as possible uniformity of chemical reactions, and of physical movement of the materials, throughout the whole cross-section in every zone of the furnace.

Two elements required to obtain this in theoretic perfection are perfect uniformity in the size and density of the materials charged and a sufficient blast volume to produce the condition of a plenum throughout the whole furnace interior. While it is impracticable to obtain for furnace use materials of perfectly uniform size and density in each of the three classes of materials used in pig iron smelting—fuel, flux and ore—it is practicable to approximate that condition by use of proper means for their preparation.

It is obvious that the feature which most directly bears upon the essential condition above mentioned is that of distribution and, in order to obtain as nearly as practicable uniformity of distribution, such preparation as will give as nearly as practicable uniformity of size must be resorted to. Uniformity of size only is not, however, sufficient; for example, uniformly large size, while giving uniformity of distribution, would be detrimental to economical operation. The preparation of materials must be in the direction of uniformity small size.

Fuel (Coke)

While this principle is much more important in its application to the ore and flux than to the fuel, it also applies to the latter. As rapidity of action is largely dependent upon rapidity of combustion of the fuel, it is desirable that the fuel should be charged in lumps of not excessive size, and preferably should not exceed 4 to 6 in. This assumes coke of proper physical condition. The physical quality and chemical purity of coke for blast furnace use are of the greatest importance. It should be strong but of not great density, and as low as possible in ash and sulphur. Nothing more greatly interferes with the regular and economical operation of a blast furnace than soft, friable or high ash coke, as everyone connected with the industry has experienced during late years under the conditions existing during, and for some time after, the late war. The disadvantage of high sulphur in the coke need not be emphasized.

Coke as charged into the furnace should be thoroughly screened to free it from smalls, commonly known as breeze, and should be of sufficient strength to prevent the excessive formation of smalls in the furnace, through the crushing effect of the burden. The strength should not, however, be of the kind which is produced by great density, which destroys the cellular structure. A dense coke burns slowly and is, therefore, inimical to rapid combustion, which is necessary for fast driving; whereas cellular structure permits the heat and the agents of combustion to penetrate readily to the interior of the lumps, thus facilitating combustion.

On the other hand, a very open cellular structure produced at the expense of strength is equally to be avoided, as tending to produce smalls through its lack of resistance to crushing by the weight it has to bear, and abrasion by its movement in the furnace. Such a fuel is also subject to excessive waste in the upper regions of the furnace before it reaches the zone of its usefulness, owing to the greatly increased reaction upon it of the CO_2 in the gases— $\text{CO}_2 + \text{C} = 2\text{CO}$. It is, therefore, of the greatest importance, in modern

*Abstract of paper before the (British) Iron and Steel Institute.

†This section has been omitted, in this abstract. It involves consideration of the power plant, blast heating plant, raw material supply plant and output disposal plant.

blast furnace practice, that coke makers should give the greatest possible attention to the production of a coke combining these two essential features—strength and porosity.

It is the carbon which does the work in the furnace, and every decrease in the percentage of ash increases the available carbon and tends in other ways toward a higher degree of efficiency. In addition to the higher fuel value of low ash coke, it is lighter in weight, requires less limestone for fluxing the ash, and a lower amount of the fuel charged is required for forming and melting the slag produced from the coke ash. It is estimated that the formation and melting of blast furnace slag requires approximately 25 per cent of its weight in fuel; therefore, for every 100 lb. of slag produced from coke ash, 25 lb. of fuel is lost so far as the smelting of iron ore—the primary object of the blast furnace process—is concerned.

Iron Ore

From the standpoint of preparation, the iron ore is the most important of all the materials charged into the blast furnace, owing to the extremes in mechanical condition, from fines to large lumps, in which most iron ores are received from the mines, and the great variety of physical characteristics in different ores. The operation of the furnace is much more usually affected, for good or ill, by the mechanical condition of the iron ore than that of either fuel or flux. It is, therefore, of prime importance that this condition should receive careful attention and whatever steps are necessary should be taken, in the way of preparation, to convert it as nearly as practicable to such condition as will insure the most beneficial effect upon furnace operation.

Two principal features are affected directly by the condition of the iron ore, both bearing upon the rate of production and upon economy. These are reducibility and distribution. The degree of reducibility of an iron ore depends primarily upon its density, a characteristic in itself not readily altered, except with dense ores containing high percentages of protoxide of iron (magnetite), the reducibility of which may be increased by subjecting them to a roasting process in an oxidizing atmosphere, thus converting the protoxide to peroxide of iron.

Rough Ores

But the rate of reduction in the furnace may be materially increased for any particular ore containing lumps, whatever its degree of density, by increasing the surface area exposed to the action of the reducing agents. The obvious method of attaining this increase in surface area is by breaking the lumps into smaller pieces. The extent to which this operation may be carried is limited by the cost of breaking the ore, a commercial consideration, and the tendency of any particular ore to produce an excessive proportion of fines in the breaking. The latter tendency, however, really does not exist to any considerable extent in ores whose condition allows of their being broken at all, for whatever smalls may be produced in the breaking are usually of sufficient size not to be classed as fines, and may therefore be safely charged into the furnace with the larger products of the breaking operation.

Increase in the rate of reduction obtained by thus increasing the surface area exposed to the agents of reduction in the furnace has, in addition to the higher possible rate of production, a very important effect upon economy of production. Of the two principal reducing agents in the blast furnace process, carbonic oxide and solid carbon, it is generally accepted that reduction of iron oxide by carbonic oxide, in the upper zones, is a much more economical reaction than the reduction of iron oxide by solid carbon in the lower zones. It is, therefore, highly desirable that the whole or the greatest possible portion of the iron oxide should be reduced by carbonic oxide gas, and that this reduction should be completed before any lumps of iron oxide have reached the zone where conditions permit, in excess, the uneconomical reaction between them and solid carbon.

It is obvious that the surest way of attaining this is so to increase the possible rate of reduction of the ore

by increasing its surface area that the maximum reduction may be effected by the carbonic oxide gas in the upper zones of the furnace. If this precaution of increasing the surface area by breaking the lumps of ore before charging into the furnace is neglected, the larger unbroken lumps will escape thorough reduction by carbonic oxide gas, with consequent waste of fuel, particularly if any attempt be made, by rapid driving, to increase materially the rate of production. To obtain a high rate of production, with economy and quality, it is therefore necessary to prepare the ores in the manner described.

The degree to which it is commercially practicable to crush an ore depends upon its density. Experience has indicated that all ores should be crushed to sizes not exceeding such as will pass through a 3-in. or 4-in. ring, although ores of great density may be advantageously crushed to even smaller sizes. The standard of 3 or 4 in., while seemingly rather small for ores of a high degree of reducibility—the so-called “soft” ores—is not determined wholly from the standpoint of degree of reducibility, but also by its bearing upon distribution.

Distribution of ore in a blast furnace is of the highest importance in its relation to regularity of operation, this in turn affecting most vitally the economy, quality and output. This question has been referred to above in a general way in connection with uniformity of action in the furnace but, important as that is as regards all the materials, solid and gaseous, entering into furnace operation, the distribution of the ore is the most important consideration in regard to the solid materials.

In considering this question it is necessary to keep in mind the great essential—*equality of action throughout the whole of every cross section of the furnace interior*. Except for the fact that the operations are taking place in a vertical shaft of circular cross section, this result would be obtained, theoretically, only with materials of exact uniformity in size and density, but the fact just mentioned introduces a feature which interferes with this theoretical requirement. It is well known that the gases have a natural tendency to ascend next to the walls, and would do so to the neglect of the interior if the furnace were filled with materials of exact uniformity in size and density.

It is necessary, therefore, in order to secure approximate equality of action, to have a somewhat greater resistance to the passage of the gases in the materials nearest the walls than in the interior. It is to this condition that the ordinary bell and hopper charging apparatus owes its satisfactory use, discharging the materials as it does in such a way that a greater proportion of the smaller particles remains next to the walls, thus providing the greater resistance to the ascending gases required there. That this distribution by bell and hopper charging may give the desired result, the relation of the diameter of the bell to the diameter of the furnace throat at the stock line is of material importance, as likewise that the falling materials shall first strike the materials in the furnace, when nearly full, at about 18 in. from the walls. The former relation is usually a bell diameter 4 to 5 ft. less than the throat diameter at the stock line. The bell angle is usually 40 to 45 deg., and in some cases 50 deg.

This method of charging results in the surface of the material in the furnace assuming the shape of an inverted cone with its base about 18 in. from the walls, from which point they slope away slightly to the surface of the walls. The smallest particles lie on the base of the cone, and between it and the walls, together with a portion of the smaller lumps and rubble. The inner slope from the base to the apex of the cone consists of pieces of gradually increasing size, with practically only the largest lumps at and near the apex. This description does not, of course, apply to an ore mixture consisting of all fines, or of lumps of uniform size, conditions which seldom exist in blast furnace practice, but it does apply to the usual run of ores.

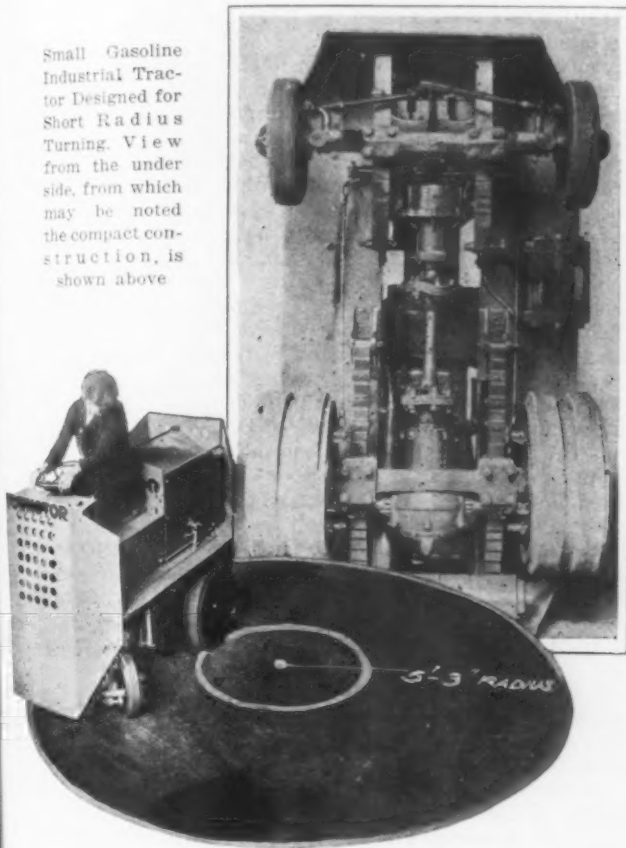
It is obvious that the greater the difference between the largest and the smallest pieces, in other words, the

(Continued on page 1253)

Smaller Tractor Offered by Towmotor Co.

A model C gasoline industrial tractor having a wheel base of 40 in., a turning radius of $5\frac{1}{4}$ ft., overall, and 40 in. wide overall has been placed on the market by the Towmotor Co., Cleveland. The draw bar pull is rated at 1150 lb. but is said to be capable of considerable increase by weighting the chassis to utilize reserve torque of the motor. The speed is 1 to 8 mi. per hr., and may be controlled by governor. The

Small Gasoline Industrial Tractor Designed for Short Radius Turning. View from the under side, from which may be noted the compact construction, is shown above.



short turning radius and the construction from the underside may be seen in the illustrations.

The motor is a four cylinder, four cycle, 3 x 4½ S.A.E. rating 14.44 hp., capable of delivering 23 brake horsepower at 2000 r.p.m. It is said to be particularly suited to heavy-duty pulling on account of high torque and flexibility. Auto-lite battery type ignition is employed, and the starter has the Auto-lite, 6-volt, starting motor with automatic Bendix type mechanism. The battery is a 6 volt, 104 ampere hour truck type, rubber insulated Willard storage battery of special construction, mounted under the frame. The carburetor is 1 in. in size with dash choke control for easy starting. A 6-gal. gasoline tank furnishes gravity feed to the carburetor and is accessibly located in front of the driver.

The frame is pressed steel of special section, 9½ in. deep by 13½ in. wide. A Borg & Beck type 10-in. single plate heavy duty clutch is employed and the propeller shaft is equipped with fabric joints between the transmission and rear axle. The transmission is of special constant-mesh selective type in unit with the motor, and has one speed forward and one reverse. The front axle is of the Elliott truck type. The rear axle is a special adaptation of the Torbensen internal gear type of drive and is said to be highly efficient for both low speed and breakaway pulls, and light duty. The reduction ratio is 8 to 1, full floating type. Timken bearings are used. The truck type sliding-block steering column is incorporated, steering connection being to the front wheels only. Cast steel disk wheels with Timken bearings are used and tires are of solid rubber, pressed on front and rear. The front tire is 16 x 3½ in. single, and the rear 22 x 3½ in. dual. Internal expanding type brakes are used at rear wheels, and are controlled by foot pedal.

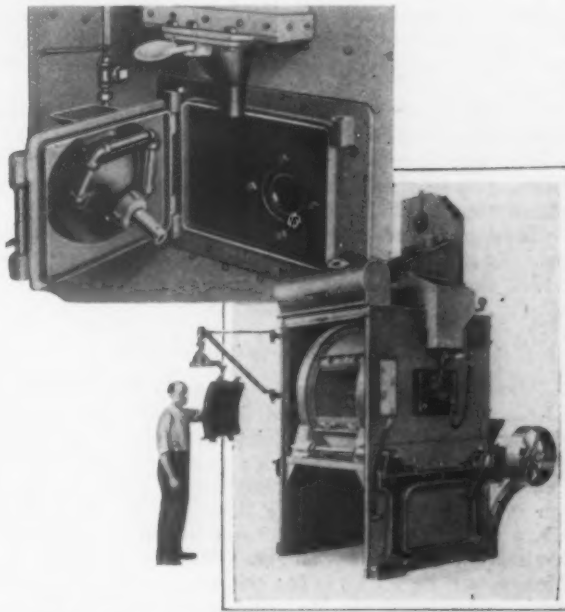
Semi-elliptic chrome vanadium steel springs are provided front and rear and are bushed and equipped with pressure lubricators and ground bolts. Bumpers are of ¾-in. steel plate, front and rear, and run full width of the chassis, integral with the frame, giving protection to vital parts and for pushing operations. The couplings provided front and rear are adjustable for height. Cooling is by the thermosyphon system. The weight of the tractor is 2900 lb., and by way of comparison it may be mentioned that the weight of the previous type, the model B., is 3975 lb.

Improved Barrel Sand Blast

A new sand blast barrel designed to decrease operating cost by increasing the efficiency of the blasting action and by increasing the durability of the equipment itself has been placed on the market by the Pangborn Corporation, Hagerstown, Md.

Cleaning capacity, in sand blasting, is largely governed by the distance of the nozzle from, and its angle to, the work. Accordingly, in the new machine the nozzles are made adjustable both horizontally and vertically to secure the most effective position to accommodate the various classes of work, with the changing sizes of the individual pieces and the corresponding "ride" within the barrel drum. A mechanical separator intended to assure efficient and constant separation of the abrasive for re-use is included. This is obtained by a ribbed roller driving against a shaft, protected by heavy rubber tubing. The tubing takes the entire wear and is conveniently and inexpensively replaced.

Durability is a feature emphasized. The barrel drum is reinforced at the door opening with plates and angles, inside and out. Steel tires are pinned to the head castings, and the driving on manganese steel rollers with front rollers idle and equipped with



Improved Barrel Sand Blast. The nozzles, shown in insert, are adjustable to give most effective position for blasting various classes and sizes of work

roller bearings, is intended to provide smooth, even traction with minimum wear. The driving sprockets are of steel and, with the chain, run in a bath of oil. The clutch is simple in design and positive in action.

Two sizes of the machine, 30 x 40 in. and 50 x 40 in., are available, these sizes being intended for small work and also for work as large as feasible for barrel cleaning.

Permits were issued in St. Louis last month for the construction of 785 new buildings of an estimated cost of \$2,683,245 and for alterations on 578 buildings at an estimated cost of \$274,038, the total for the month being \$2,957,283, as compared with \$1,557,173 in October, 1921, a gain of \$1,400,110.

BRITISH FOREIGN TRADE

September Steel Exports Increase—Imports Third Largest of the Year

The September official data on British foreign trade in steel and iron show that the total exports were 289,344 gross tons. This is an increase of 7390 tons over August. The September exports make the average for the first nine months 273,715 tons per month. Exports of scrap are included. To Oct. 1, this year, total exports have been 2,463,440 tons against 1,163,560 tons for the same nine months in 1921.

The September imports were 83,186 tons, those in January having been 100,178 tons. The average for the first nine months of this year is now 75,804 tons per month. These data also include scrap. The following table shows comparative data:

British Steel Exports and Imports, Gross Tons		
	Exports	Imports
July, 1922.....	251,743	55,893
August.....	281,954	84,003
September.....	289,344	83,186
Aver. per month, first quarter, 1922.....	267,047	82,536
Aver. per month, second quarter, 1922.....	274,830	67,785
Aver. per month, third quarter, 1922.....	274,347	74,360
Aver. per month, 1921.....	144,885	152,734
Aver. per month, 1920.....	274,881	128,685
Aver. per month, 1919.....	188,519	50,801
Aver. per month, 1913.....	420,757	195,264

The following table covers the principal exports:

Principal British Exports, Gross Tons				
	Average per Month		September—	
	1913	1921	1921	1922
Pig iron.....	78,771	8,602	5,108	69,950
Steel rails.....	41,676	14,698	20,090	16,375
Steel plates.....	11,162	10,673	6,016	6,402
Galvanized sheets.....	63,506	17,635	21,670	35,041
Steel bars.....	20,921	8,927	9,805	18,122
Tin plates.....	41,208	18,873	19,792	35,258
Black plates.....	5,679	1,178	1,256	2,770
Steel sheets.....			3,729	13,870
Total exports, first 9 months, 1922.....				2,463,440
Total exports, first 9 months, 1921.....				1,163,560

The most marked recovery in the September exports this year over those in September, 1921, has been in pig iron, galvanized sheets, steel bars, steel sheets and tin plates.

Pig iron imports in September were 11,665 tons compared with a monthly average in 1921 of 55,564 tons.

Iron ore imports in September were 299,387 tons which compares with a monthly average in 1921 of 157,298 tons.

Manganese ore imports in September were 49,437 tons. Last year they were 14,405 tons per month and in 1913 they were over 50,000 tons per month.

Analyzing Sand Physically

Frank W. Brooks, chief engineer William Swindell & Bros., Pittsburgh, will be the speaker at the next meeting of the Chicago Foundrymen's Club, which will be held at the City Club, Chicago, at 7 p. m., Nov. 11. His subject will be Multiple Melting of Steel and Gray Iron in the Foundry. At the December meeting of the club, a collection of about 100 samples of molding sand physically analyzed by Eugene W. Smith, Crane Co., Chicago, will be shown. The process, originated by Mr. Smith, consists of placing sand and water in a bottle and shaking the mixture on a vibrating machine. The effect is to separate the silica and the bond, clearly indicating the proportion of each in the sand. The process will be fully explained by Mr. Smith at that meeting.

Midvale's Increase

In its report last week the Midvale Steel & Ordnance Co. showed an improvement of \$700,000 during the third quarter as compared with the three months ended June 30. Net earnings for the quarter, after taxes, totaled \$1,076,921, as compared with \$354,374 in the previous quarter, and \$688,238 for the corresponding period a year ago. After interest and depreciation there was a deficit of \$760,864 as against \$1,435,111 in the preceding three months, and \$1,249,136 for the same period of 1921. For the nine months ended Sept. 30, last, net earnings were \$1,817,265 as compared with \$1,796,229 in 1921. After allowing for all deductions,

there was a deficit of \$3,348,802 for the period as compared with a deficit of \$3,933,931 in 1921 and with a balance of \$10,314,574 in 1920. The increase over the preceding quarters may possibly be ascribed to the fact that the company did not suffer so severely from car shortage as did many companies.

Reparation Awarded Pittsburgh Steel Co.

WASHINGTON, Nov. 7.—A decision handed down last Saturday by the Interstate Commerce Commission in relation to a complaint of the Pittsburgh Steel Co., gave recognition to the propriety of selling the shipments involved on the basis of f.o.b., Pittsburgh, which takes on increased interest in view of proceedings before the Federal Trade Commission concerning the Pittsburgh base plan. The commission held as unreasonable and made an award of reparation to the complainant in connection with its complaint against the Director General, et al., as to a rate of 25.5c, fifth class, on a carload of nails and a mixed carload of nails, wire and staples, from Monessen, Pa., to Weston, W. Va., imposed on shipments made in July, 1919. Contemporaneously there was a rate of 19.5c from points in the Pittsburgh district on the Baltimore & Ohio to Weston other than Monessen, a local point on the Pittsburgh & Lake Erie, the former being the delivering carrier to Weston. Previous to Nov. 1, 1918, the 19.5c rate also applied from Monessen. It was restored Oct. 27, 1919.

The Director General alone defended the case and opposed payment of reparation. The commission held that inasmuch as the freight was sold on the basis of f.o.b. Pittsburgh, the complainant's customer deducted the excess of 25.5c over 19.5c from the invoice price and that therefore the complainant was entitled to reparation.

Bethlehem Purchases Dry Dock Company

The Bethlehem Shipbuilding Corporation, Ltd., has purchased the Simpson's Patent Dry Dock Co., Jeffries Point, East Boston, with a view to making it an integral part of the Bethlehem shipbuilding system. Under the direction of S. W. Wakeman, general manager Fore River Works, Bethlehem Shipbuilding Corporation, Ltd., the new property will be turned to active use at once.

The Simpson dock was built in 1856, and the repair department started in June, 1919. The unit buildings are of concrete and brick construction, and include a power plant, pumping plant, property department, plate department, carpenter shop, marine shop and three dry docks. At present 150 are employed. The normal operating force is approximately 330. For the present, at least, there will be no change in the personnel. The purchase will give the Fore River Works, Quincy, Mass., additional repair facilities in Boston harbor, and will eliminate the towing of some of its repair work to Quincy Point and back again to Boston harbor.

Buildings of Structural Steel

In a 72-page booklet, 9 1/4 x 6 in., issued by McClintic-Marshall Co., Pittsburgh, are represented pictorially more than 60 buildings, mainly industrial, which have been put up by the company. Among these are open-hearth and mill buildings for the Republic Iron & Steel Co., Weirton Steel Co., Inland Steel Co., Mansfield Sheet & Tin Plate Co., Tata Iron & Steel Co. of India, Ashtabula Steel Co., and a number of others, besides all of the massive lock gates of the Panama Canal, involving 55,000 tons of steel. Buildings for Westinghouse, General Motors, Norfolk Navy Yard, Chicago Union Station and other structures are shown.

Witherbee, Sherman & Co., Port Henry, N. Y., have placed their entire piping installation, necessary for the new 500-ton blast furnace which is now in process of erection, with B. Floersheim & Co., Pittsburgh, Pa. B. Floersheim & Co. are closely affiliated with the Crane Co., Chicago, and all the latter's products will be used as a standard. Delivery of material will begin in about three to four weeks and will be completed within three months.

Auxiliary Problems in Steel Making

Contributions on Heating Furnaces, Power Plants,
Fluorspar and Coal Read Before American
Iron and Steel Institute

IN THE IRON AGE last week were published abstracts of four of the papers presented at the twenty-second meeting of the American Iron and Steel Institute in New York, Oct. 27. They covered the electric furnace, steels for automobiles, open-hearth furnace design and liquid fuel in metallurgical furnaces. Portions of the remaining papers in the program, covering heating furnaces, power plants, fluorspar and coal, follow:

Heating Furnaces for Blooms, Slabs and Billets

Results of Tests Show Greater Efficiency of the Continuous Recuperative
Type Than in the Regenerative Furnace

BY W. P. CHANDLER, JR.*

THERE are two main types of furnaces in use for heating blooms, slabs and billets, the continuous and the non-continuous. The latter is similar in construction to the open-hearth furnace; the direction of the gas flame across the hearth is periodically reversed and the furnace is usually equipped with regenerative checker chambers for preheating the air used for combustion. The blooms or slabs which this type of furnace usually heats are charged on the hearth of the furnace and remain in the one place until hot enough to roll.

As the continuous furnace is not reversed, the flame always travels in one direction, while the steel, usually in the form of billets, passes through the furnace in the opposite direction. Cold billets enter the furnace at the coolest point and are pushed forward to the point of

maximum temperature, where they are discharged to the rolls. In the continuous furnace the billets lie tight together on the skids, forming a large steel plate on the floor of the furnace. Only the top of the billet is exposed, so that all the heat required to bring the steel to rolling temperature must be absorbed by this surface. In the non-continuous furnace there is an open space between blooms, so that three sides are available for directly absorbing the heat from the products of combustion or roof, while the fourth side, resting on the heated hearth of the furnace, absorbs from it a large amount of heat.

The dimensions of the non-continuous furnace do not affect directly the time of heating, but in the continuous furnace, with the rolling mill handling a given number of bars per hour, the length of the furnace fixes the time of heating. With everything else the same, the time of heating in a continuous furnace varies as the square of the thickness of the billet, so that a 5-in.

*Fuel and experimental engineer, Carnegie Steel Co., Duquesne, Pa. Abstract of a paper read before the American Iron and Steel Institute, at New York, Oct. 27.

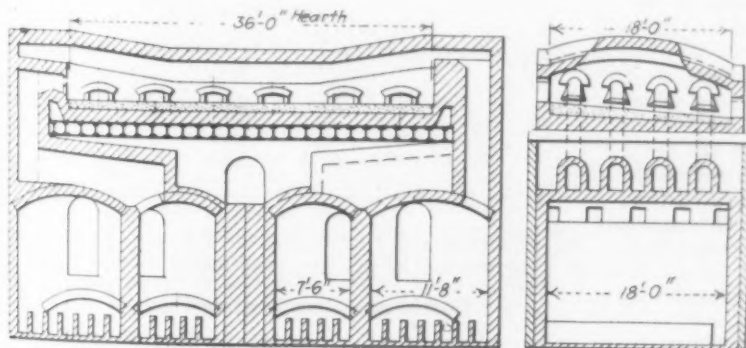
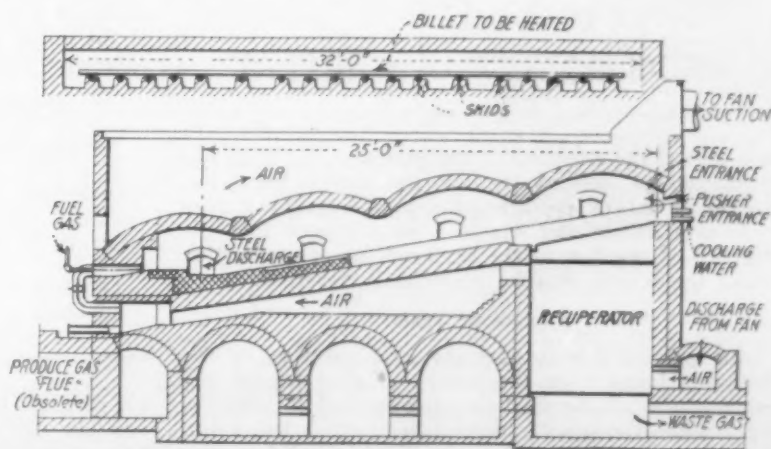


Fig. 1. Non-Continuous (Reversing) Regenerative Heating Furnace—Longitudinal and Transverse Sections. This type is most common for large blooms, which lie stationary while being heated (At left)

Fig. 2. Continuous Recuperative Furnace, with Side Charging and Discharging Doors Through Which the Billets Are Passed Longitudinally. At top is a cross-section of this furnace, showing how the billet rests upon the numerous skids in its passage sideways through the heating chamber (At right)



square billet requires four times as long as a 2½-in. square billet. This means that for the larger sizes of billets long furnaces are needed to give the capacity required by the rolling mill. For blooms and slabs the general practice so far has been to use non-continuous furnaces, but for 5 x 5-in. billets and smaller the continuous furnace proves very satisfactory.

Certain of the alloy and spring steels, if heated too

number and weight of blooms entering the furnace. The heat supplied to the furnace was determined from the heat value of the fuel gas, as calculated from the chemical analysis, and the number of cubic feet of gas burned, reduced to standard condition of 62 deg. Fahr. and 30 in. of mercury pressure.

Losses were calculated according to usual engineering practice, the loss due to radiation being taken as

Table I.—Data and Results of Test on Reheating Furnaces

Type of furnace.....	Non-Continuous Regenerative			Continuous Brick Recuperator			Continuous Cast Iron Recuperator		
Duration of test, minutes.....	370	290	390	410	400	420	420	410	420
Section of billet, in.....	5½ x 5½	5½ x 5½	5½ x 5½	3¼ x 3¼	3¼ x 3¼	2½ x 2½	2x2	2½ x 2½	2½ x 2½
Weight of billet, lb.....	500	1,120	1,300	1,100	1,100	650	420	650	650
Number of billets heated.....	1,480	142	177	345	361	532	917	693	662
Steel heated per hr., lb.....	36,486	32,905	40,743	54,214	45,637	49,400	55,020	65,952	60,014
Temperature, heated steel, Fahr.	2,076	2,047	2,118	2,087	2,179	2,164	2,056	2,058	1,994
Gas burned per ton of steel, cu. ft.	3,790	3,522	4,095	2,347	2,425	2,598	3,000	2,485	2,637
Flame temperature, deg. Fahr.	2,563	2,511	2,676	2,600	2,622	2,570	2,430	2,406	2,408
Stack temperature, deg. Fahr.	839	868	936	552	563	565	716	629	655
Efficiency of furnace, per cent.	38.70	40.91	36.47	62.18	63.07	58.29	47.30	57.41	52.52
Recuperative efficiency, per cent.	59.75	58.67	57.30	22.09	26.06	20.25	19.00	23.02	14.20
Radiation loss, per cent.....	34.60	32.56	32.52	16.48	14.54	20.84	20.74	13.18	16.06
Loss to stack, per cent.....	22.39	22.08	26.18	17.56	18.13	16.85	26.24	24.72	26.09
Other losses, per cent.....	4.31	4.45	4.83	3.78	4.26	4.02	5.72	4.69	5.33

rapidly, tend to crack, so that care must be used in bringing such billets up to rolling temperature. The continuous furnace fits this class of steel admirably, since the billet enters a relatively cool part of the furnace and is gradually heated to the temperature required for rolling.

Non-Continuous Regenerative Furnace

A non-continuous regenerative furnace is shown in Fig. 1. The hearth, which is 18 ft. wide by 36 ft. long, has a silica bottom, made by fusing sand in thin layers

Table II.—Efficiencies Obtained

Furnace	Run No. 1	Run No. 2	Run No. 3	Average	Type of Furnace
No. 2 Mill	62.18	63.07	58.29	61.18	Continuous recuperative
No. 5 Mill	38.70	40.91	36.47	38.69	Non-continuous regenerative
No. 6 Mill	47.30	57.41	52.52	52.41	Continuous recuperative

until the proper thickness is reached. A slight slope toward the rear of the furnace allows the slag which forms to drain through spouts into slag pots. The steel is charged and drawn through doors in the front by a charging machine. Four ports at each end of the furnace admit gas with part of the air for combustion. The remaining air for combustion enters through a wide port opening between the roof and the top of the gas ports.

Two regenerative checker chambers are provided at

Table III.—Temperatures of Gases Leaving Furnace Chamber

Non-continuous regenerative	2001 deg. Fahr.
Continuous recuperative	1192 deg. Fahr.

each end of the furnace, as the producer gas used was preheated, as well as the air for combustion. The checker chambers are connected to the stack by flues containing valves and dampers, so arranged that the direction of the flow of the hot products of combustion across the hearth may be periodically reversed.

Results of Tests

On tests of this furnace the heat absorbed by the steel was found from the weight of steel heated, the temperatures of the steel on entering and leaving the furnace and the specific heat of steel, which was taken as 0.166. The weight of steel was obtained from the

the difference between the heat supplied in the gas and the sum of heat absorbed by the steel and all losses except radiation.

The efficiency of the furnace as shown is the ratio of the heat absorbed by the steel to the heat delivered in the gas. The efficiency of the regenerator was calculated by assuming that all the heat in the gases entering the regenerator was available for absorption by the air. The difference between the heat content of the gases entering and leaving the regenerator was assumed as the heat absorbed by the air. The efficiency shown is the ratio of the heat absorbed by the air to the sensible heat of gases entering the regenerator.

From the tabulated results it will be seen that the efficiencies varied from 36 to 41 per cent. With the highest efficiency the following conditions prevailed: the lowest rate of heating steel, the lowest gas consumption, the lowest radiation and the lowest stack loss, while the reverse conditions prevailed on the test having the lowest efficiency. The greater rate of heat-

Table IV.—Drop in Air Pressure Through Recuperators, in Inches of Water

Furnace No.	Type of Recuperator	Run No. 1	Run No. 2	Run No. 3	Average
2	Brick	2.11	2.40	1.55	2.02
6	Cast iron	1.18	1.38	1.41	1.32

ing is accompanied with greater furnace temperature and corresponding greater heat losses.

Continuous Recuperative Furnace

A continuous billet heating furnace equipped with a recuperator for preheating the air for combustion is shown in Fig. 2. The billets enter through a side door in the upper end of the furnace, passing into the furnace on rollers, are pushed forward on the skids by a

Table V.—Efficiency as Affected by Billet Size

Furnace No.	Test No.	Billet Size in Inches	Per Cent Radiation Loss	Per Cent Efficiency
2	1	3¼ x 3¼	16.48	62.18
2	2	3¼ x 3¼ and 2½ x 2½	14.54	63.07
2	3	2½ x 2½	20.84	58.29
6	1	2 x 2	20.74	47.30
6	2	2½ x 2½	13.18	57.41
6	3	2½ x 2½	16.06	52.52

set of arms which operate through the rear end wall and are discharged through a small door in the side wall at the other end of the furnace by a pusher bar

driven by pinch rolls. The discharge door is in line with the first pass of the roughing rolls, so that the billet enters the rolls before being completely discharged from the furnace.

This design is possible where only one furnace supplies a mill. If two or more furnaces are used the billets usually fall from the hearth, through the end of the furnace, upon the rollers of the transfer table. This requires an opening in the end of the furnace, extending the full width. While the opening is partially closed by swinging doors, bars or pipes, it allows a large amount of cold air to pass into the combustion chamber at the point where the billets are being heated to their highest temperature.

The roof consists of four arches thrown in the direction of travel of the steel. The skewbacks for these arches are supported by a water-cooled system of pipes hung by straps from steel beams which rest on the side walls of the furnace. The side walls extend 3 ft. above the arch. Steel trays filled with sand are placed over the beams, forming an air space over the roof.

Water-cooled skids are used to bridge the opening into the recuperator chamber, but no water-cooling occurs beyond the point where the fire brick floor of the furnace commences. Cast iron skids support the billets to within 3 ft. of the discharge door, where a magnesite brick bottom, built flush with the tops of the skids, covers the floor of the hearth. The cast iron skids without water-cooling give excellent service. Fifteen burners are provided across the end of the furnace.

While the furnace shown has a recuperator of vertical cast iron pipes supported by plates, another furnace, also, was tested, having a brick recuperator. The recuperator has received a great deal of attention abroad and a number of special form tiles have been developed with which it is constructed. In one type, where the recuperator chamber is located below the furnace, the air for combustion passes upward, by natural draft, through vertical rectangular flues, while the waste gases entering at the top travel through horizontal flues and make two passes across the outside of the air-carrying tile. Great care has been used to prevent leakage from the air passageways into the waste gas flues and the tile has been designed as thin as is consistent with the necessary strength.

Results of Tests on Recuperative Furnaces

Continuous recuperative furnaces are more efficient than regenerative furnaces, as shown in Table II. This higher efficiency is due to the method of operation of the continuous furnace, in which the cold steel enters the furnace at one end and progresses slowly to the other end, at which time it has become hot enough to roll. The gases traveling in the opposite direction—from the hot to the cold end—are cooled by the steel and therefore leave the furnace chamber at a much lower temperature than the gases of the regenerative furnace. In the latter furnace all parts of the hearth are maintained at the same temperature. The principal heat losses of heating furnaces are the stack losses and radiation, as shown at the bottom of Table I.

Table II clearly shows why the use of regenerative furnaces should be limited to those places where it is impossible to apply the continuous recuperative furnace, for less than half of the heat in the gas enters the steel in the non-continuous regenerative type. The regenerative furnace does not lend itself to insulation to prevent radiation, because the temperature over the entire chamber is the same and usually so intense that if insulation were applied the limit of the refractories would be reached and the furnace destroyed. The continuous recuperative furnace, on the other hand, does lend itself to insulation to prevent radiation, because this furnace is comparatively cool and most of the radiating areas can be insulated.

The two continuous furnaces tested had different recuperators. Table IV gives the losses in air pressure through the two types.

The greater drop in air pressure through the brick recuperator is due mainly to the sharp turns around the ends of the baffles placed in the recuperator. The cast iron recuperator also has a distinct advantage over

the brick recuperator in that its passages can be made with surfaces smooth enough and of such shape that the drop in air pressure through it will be less than can be secured in brick recuperators, where the passages in most cases must be made of rectangular cross section and have rough surfaces. Cast iron is also much better for conducting heat than fire brick.

In both series of tests on continuous recuperative furnaces the efficiencies were highest when the largest size billets were handled. Table V gives the size of billets, radiation loss and efficiency for the series of tests on the two recuperative furnaces.

It will be noted that the series on the smallest size billets had the largest radiation loss. This may be due to improper operation or design. The smaller size billets heat more quickly and are at rolling temperature before arriving at the discharging end. This causes a higher average temperature of steel, roof and side walls inside of the furnace, resulting in greater radiation loss.

Conclusions and Recommendations

From the results shown, the development of heating furnaces should be along the lines of continuous recuperative furnaces unless some special reason makes it necessary to use another type. The recommended type as now built is superior to other types, and can be made even more efficient by development. Recommendations for improvement follow:

A.—The roof should be placed at such a height above the steel that the gases may wipe both surfaces and yet not encounter too much resistance to their flow. A flat roof eliminates the necessity of water-cooling arch supports. Some method of longitudinal corrugation may be advisable, to increase the surface for absorbing heat from the products of combustion. This would make available more heat for radiation from roof to steel and increase the rate of heat transfer.

B.—The slope of the hearth of the continuous furnace from the charging end to the discharging end should be not too great. This applies especially to long furnaces to handle large billets. The use of a basic lining for reversing furnaces would give a supply of basic cinder. This can be used in open-hearth furnaces to replace lump ore.

C.—Solid cast iron skids should be installed on the floor of the furnace, to eliminate the heat lost in cooling water and to simplify construction.

D.—A series of burners should be installed across the width of the furnace, to secure a uniform temperature. The burners should be equipped with valves for independent control of both fuel gas and air for combustion.

E.—Each furnace should be equipped with means whereby the gas and air pressures on the burners may be automatically maintained constant, and with an integrating and recording device which will accurately measure the amount of gas used.

F.—The pusher for advancing the steel along the skids should give a uniform motion that can be regulated very closely, both in regard to distance and speed.

G.—The use of a roof recuperator should be limited to that section of the roof in which the refractory property of the brick will not permit it to be insulated.

H.—The side discharge is superior to the dropping end discharge, from a fuel standpoint. It eliminates loss of heat due to the exposure of a poorly insulated surface to radiation from the hottest zone of the furnace, as it is impossible properly to insulate the swinging door on account of its construction and the abuse it receives. The side discharge admits less cold air to the furnace chamber and a side charging mechanism prevents to a large extent the leakage of air into the furnace.

I.—The use of metal in recuperator construction has certain advantages over brick. It has a greater heat transfer rate and is not so susceptible to cracking, with consequent air leakage. The possibility of a design with the use of pipes or tubes similar to watertube boilers looks attractive. The recuperator should be constructed so that it offers the least resistance to the flow of air and gas, consistent with good heat transfer. It

should be located where it is easily accessible for inspection and repair. Placing it above the furnace instead of under ground should be carefully considered. A better distribution of the waste gases, both through the furnace and in the recuperator, would be possible than is the case where the entrance to the recuperator is directly below the steel to be heated, since the gases must pass over the ends of the billets. Additional insulation would be required, but no drainage water could collect in the bottom of the chamber or flues.

J.—Insulation should be used to prevent radiation, as far as possible, without reaching the refractory limit of the fire brick and yet remain under the point where first cost would overbalance economy.

K.—Water-cooled parts should be avoided wherever possible, because they are hard to keep in repair and dissipate an appreciable amount of the total heat of the gas; their elimination reduces the cost of supplying cooling water.

L.—Several installations of waste-heat boilers have been made in connection with heating furnaces. However, the development of the recuperator holds such possibilities that furnace efficiencies comparable to good boiler practice should be obtained. Future development, however, may show that in some cases of non-continuous regenerative furnaces the waste-heat boiler may have a field.

Discussion

Prof. W. Trinks, Carnegie Institute of Technology, Pittsburgh, stated that the size of billets is not the deciding factor in the choice between continuous recuperative furnaces and non-continuous or reversing regenerative furnaces. He cited instances where a continuous furnace is in use in Pittsburgh for heating blooms 9 x 9 in. in section; another one in Philadelphia is used for heating ingots 17 in. square, while two other mills in Pennsylvania use these furnaces for heating ingots of 22 in. and 24 in. respectively. On the other hand, he knew of no cases where skelp is heated in a continuous furnace. He pointed out that one important element in the choice of furnace is the question of continuity of operation in the mill. Any mill running on small orders and subject, consequently, to frequent roll changes, or any mill in which much trouble is experienced, causing shutdowns for one reason or another, is a poor proposition for the use of a continuous furnace.

He also stated that the usual purpose in the use of a continuous furnace is not so much a question of fuel saving as of labor saving.

Much leakage of air in and beyond the recuperator is charged by Professor Trinks against the use of the recuperative continuous furnace. In a test of one of the furnaces involved in the present paper, such leakage was found to amount to 30 per cent of all the air passing through the recuperator, with the result that only 400 deg. rise in temperature of air was obtained in place of 600 deg. expected. In another similar furnace, air leakage amounting to 65 per cent was found, with correspondingly reduced efficiency in the recuperator. He laid particular stress on the fact that any mill trouble or variation in sections cuts down furnace efficiency very heavily.

W. D. Chapman, president Chapman Engineering Co., New York, advocated a much greater amount of pre-heating in the recuperator, pointing out that a rise of 400 deg. produces a saving of 10 per cent in fuel, whereas a rise of 1300 deg. results in saving 30 per cent of the fuel. These are theoretical figures. Practically, however, the savings work out even greater than this in both cases, because of the fact that with highly pre-heated air not so much excess air is required in consuming the fuel. He also advocated the use of a design of furnace which would pass the gases both above and below the steel to be heated, instead of merely above. This would result in more rapid heat transfer between the gases and the steel and in every way conserve efficiency.

Mr. Chapman referred to a test he had made with an English recuperative furnace using a high temperature of air, in which the consumption of coal per gross ton of steel was 174 lb. In this case, ingots were being heated which measured 14 x 16 in. at one end and 16 x 18 in. at the other and which were only 5 ft. 2 in. long. Two 8-hour shifts were employed, with 4-hr. idle periods between shifts. Each recuperator tile used in this furnace measured about 12 in. high, 5 in. thick and 8 in. deep. Each tile had four vertical passages, so small that there could be no core of air in the center which would not receive heat. In this particular case the passages were 1 1/2 x 2 1/2 in. in section. The waste gases, passing on the outside of these tiles horizontally, serve to heat the vertically moving air within the small passages.

Power Plants in the Steel Industry

Their Economic Importance—How Power Costs Compare with Ingot Cost and with Payroll

BY E. F. ENTWISLE*

DURING recent years tremendous development has been made in the size, reliability and control of electrical apparatus for steel plant service and in the generation and transmission of the power required for its operation. Its almost innumerable applications have been so general in character and large in total that in many cases the development of the plant's own power supply has not kept pace either in economy or size with the peak power demand, so that electric current frequently must be purchased to take care of these maximum load periods.

The true cost of power is not generally fully appreciated, total power cost being defined as the cost of producing or purchasing all the energy for generating steam, electricity and blast furnace blowing. In such a cost, waste heat must be accorded a value commensurate with the value of the fuel that would have to replace it if the waste heat were not available. While it is true that the value placed on such waste

heat is returned as a credit to the cost of the producing department, its real value must be set down as an item of power expense in order to appreciate fully how large an item power actually is in production costs and for a proper realization of the importance of its economic use.

The data submitted, taken from the cost records of three of the Bethlehem steel plants, cover the period from Jan. 1, 1920, to Aug. 1, 1922. This period is fairly representative of modern practice, 1920 being a year of good production, but with many wartime prices and practices still continuing, 1921 being a year of low production and best possible economy, and 1922 being a period of increasing production, with a continuance of improvement in the economies of 1921.

The table shows the ratio of the cost of total power generation to the costs of some of the principal and more familiar items entering into production costs. From these figures have been eliminated all the effects of such pig iron and coke as were manufactured for shipment to outside customers, so that the data applies generally to any steel plant the operation of which extends from coke ovens to finished steel products. In

*Assistant general manager, Steelton plant, Bethlehem Steel Co., Steelton, Pa. This is an abstract of a paper read before the American Iron and Steel Institute, at New York, Oct. 27.

the first set of figures, blast furnace and coke oven gas and waste heat are charged to costs at full value. In the second block, all charges for such waste heat products have been eliminated, and all power purchased

plant payroll, or 5½ per cent of the total sales value of all manufactured products, or twice the cost of all refractories, commands attention. How to reduce it, and the extent to which it can be reduced, constitute the real economic question. Every plant is a problem in itself, and no definite formula can be laid down that is applicable to all. But comparatively few plants are in a position where their total power costs cannot be reduced and at the same time show a good return on the expenditures required to make the reduction.

In general there are three points of attack on the problem, after the cost analysis has been made: first, on the prime movers of mill and auxiliary drives; second, on the electric generating and blast furnace blowing plants; and third, on the steam plants.

Keeping these three general points in mind, it is interesting to return to the tabulated figures, particularly items 7 to 14, inclusive, as they illustrate to some extent the possibilities referred to.

A is the average of plants in which power requirements are about evenly divided between steam and electricity; B is a plant which is primarily motor driven. While the nature of the products from plant B requires nearly twice the quantity of power per ton as the products from A, B's power bill per ton is scarcely greater than A's, due to its more extensive recovery of power, proportionally, from its by-product gas and waste heat, and in spite of the fact that 28 per cent of its total electric power must be purchased at a unit cost of about four times its own generating cost, all of its own power being generated by gas engines. Plants A purchase 14 per cent of their electric power consumption. Improvements now under way at B will eliminate this excess burden, and a truer comparison of the accomplishment possible may be seen in the second block of figures, in which gas and waste heat charges have been eliminated and the power now being purchased figured at plant producing costs.

Further reductions in this plant's power costs may be made through the replacement of its existing boiler plants. It is safe to say that this plant, or any one similar in equipment and power requirements, can reduce its total power bill, eliminating all charges for by-product gas and waste heat, to about 5½ per cent of its total ingot cost.

	Including Value of By-Product Gas and Waste Heat		Not Including Any Value for By-Product Gas and Waste Heat and with Total Power Consumption Figured at Plant Producing Cost	
	A	B	A	B
Ratio of total power cost:				
1. To delivered cost of all coal for coking.....	0.82	0.60	0.60	0.28
2. To delivered cost of all gas, coal and oil.....	1.67	0.64	1.22	0.30
3. To delivered cost of all ore.....	0.65	0.60	0.48	0.28
4. To delivered cost of all limestone.....	5.35	2.40	3.90	1.10
5. To delivered cost of all alloys.....	2.45	2.16	1.80	1.00
6. To delivered cost of all refractories.....	2.70	2.98	2.00	1.40
7. To total ingot cost.....	0.138	0.142	0.101	0.065
8. To total plant payroll.....	0.255	0.230	0.187	0.106
9. To sales value of all finished products.....	0.071	0.080	0.052	0.037
10. Horse power hours consumed per ton of shipments.....	286	242	286	242
11. Kilowatt hours (including equivalent of blast furnace blowing) consumed per ton of shipments.....	256	516	256	516
12. Per cent of blast furnaces blown by gas engines.....	100	100	100	100
13. Per cent of Item 10 generated by waste products.....	39	63	39	63
14. Per cent of Item 11 generated by blast furnace gas.....	78	72	....	....

is assumed to have cost the same as the power generated at the plant.

Relation Between Power and Other Costs

Any single cost item that, stripped of all credits, reaches the proportion of nearly one-fifth of the total

Fluorspar and Its Uses

Its Rôle in the Open-Hearth Furnace—Other Uses—Production, Importations and Prices

BY G. H. JONES*

FLUORSPAR, a comparatively unknown non-metallic mineral of moderate cost, widely distributed geologically, but of commercial value only in a few places in the world, is of essential and economic importance to steel makers from the fact that 80 to 85 per cent of the world's production is used in basic open-hearth and electric furnaces as a flux and detergent, and there is no known substitute. Its consumption runs evenly with the production of basic open-hearth steel ingots, and its production increases or decreases as the steel business is good or bad.

The demand for steel making is for a washed gravel, sized ¼-in. and under, of 85 per cent and over in calcium fluoride and not to exceed 5 per cent in silica, and free from sulphides, lead and zinc, the shipper being penalized according to an agreed percentage, varying with different buyers, for a lower calcium fluoride or a higher silica content than the percentages here given. A properly equipped mine has its own laboratory and watches the analyses as they are made from the mill feed, mill run and car loadings, and is therefore in a

position to guarantee to the user the analysis specified.

Necessity for Specifications

I suggest the necessity for buyers to adopt standard specifications for fluorspar and that this be taken up with the American Society for Testing Materials in order to determine what analysis is best for steel makers and other users, presenting penalties for inferior quality, and a bonus for superior ones, as in the case of iron ore.

The open-hearth melter would then know exactly what he had to work with. It is a common assumption that the melter throws in so much spar whether high or low in calcium fluoride or silica, but that is not the case as he uses only enough to bring about the reaction required, and in that way readily determines the grade employed.

Rôle of Fluorspar in the Open-Hearth Furnace

From the heads of the operating departments of a large steel company, I have been given the following information:

The elimination of phosphorus and sulphur depends almost entirely upon the limestone, so in order to take

*President Hillside Fluorspar Mines, Chicago. This is an abstract.

care of the phosphorus and sulphur it is necessary at all times to have a highly basic fluid slag. Phosphorus is reduced at a low temperature while sulphur is reduced at a high temperature. In fact, most of the sulphur is reduced after the heat has been melted and the slag made fluid and the bath raised to higher temperature.

The limestone slag, immediately after the heat is melted, lies like a blanket upon the bath and to insure proper oxidizing conditions it is necessary to thin up the slag, and render it more fluid so that the metallic contents of the bath will come into more intimate contact with the oxidizing slag. It is the universal practice in this country to use fluorspar for this purpose. Fluorspar acts as a neutral reagent and does not affect the basicity of the slag. The increased fluidity not only allows for quicker elimination of impurities in the metal but allows the transference of heat from the fuel to the bath of metal in much quicker time.

Twenty years or more ago it was the general practice in most of the steel plants of this country to add fluorspar just before the furnace was ready for tapping. During later years, however, it has become the more general practice to add the fluorspar in the early stages of the working of the heat, not only to allow the slag time enough to function properly with regard to impurities in the metal, but to eliminate sulphur at higher temperature and to allow the furnaceman more opportunity to quickly raise the temperature of the bath in case it is necessary to tap the heat a little early.

In some steel making districts, particularly in the East, pig iron is apt to be high in phosphorus and low in manganese and it is the general practice where scrap is plentiful and cheap, to charge as little pig iron as possible. Iron of this character requires a high lime charge, due to the fact that the small pig iron charge with consequent decreased amount of silicon and manganese does not tend to create a fluid slag; therefore, large additions of fluorspar are necessary. High manganese pig iron increases the fluidity of the slag and, therefore, decreases the amount of fluorspar necessary for thinning out the slag. A low silica content in fluorspar is most desirable as a high silica content means additional limestone. The latter item is not desirable from a tonnage standpoint because a high limestone charge adds to the time of heat in the furnace with the subsequent reduction of tonnage.

The general practice in this country would indicate the average consumption of from 8 to 10 lb. of fluorspar per ton of steel. This depends upon the character of pig iron, scrap, etc., used in the various districts. The use of alumina as a substitute for fluorspar is being advocated in some quarters but to date has not been proved up commercially.

No bad effects of the spar on the walls or roof of the open-hearth furnace have been known and it has been found as time goes on that open-hearth superintendents are increasing the amount of fluorspar used per ton of steel melted.

Dr. H. M. Howe in "The Metallurgy of Steel" (1890) in summing up fluorspar says it appears to favor dephosphorization:

1. By liquifying the slag and enabling it to assimilate the lime present, part of which might otherwise remain unmolten and inert and thus rendering the slag effectively basic to it.
2. Probably by volatilizing silicon from the metal, thus diminishing the formation of silica and thereby increasing the basicity of the slag.
3. In certain cases, for example, when the conditions are not strongly oxidizing, by volatilizing phosphorus as fluoride.

Dr. Richard Moldenke at the New York Institute meeting, Feb. 19, 1922, claimed that basic hearth electric furnaces should be used in every new installation. To desulphurize rapidly and well, lime and fluorspar must be used in combination to form an active slag on the molten metal.

THE IRON AGE, April 6, 1922, under the heading of "Fluorspar in the Open-Hearth" reviewed editorially an article from a German source previously printed in THE IRON AGE of March 23, 1922, to which I refer you.

Outside of the steel industry many uses, and growing

ones, are found for fluorspar. The glass, ceramic and enameling trades, including enameled tile and brick, are the next largest users, and use the highest grade hand picked and ground spar. Then come perhaps the electrolytical smelting of lead and antimony and other non-ferrous and ferrous smelters. It is also commencing to regain the standing it once had among foundries, the demand from which is expected to steadily increase, as the benefits derived include the reduction of the coke necessary on account of the reduction of the number of pounds of fluxing material used. Cleaner castings are obtained on account of more fluid metal and greater freedom from slag, and stronger castings for the same reason. Less iron is lost in the slag and the slag is more liquid. Less work is required in cleaning and repairing the cupola and taking care of the dump, by reason of the liquid slag causing the cupola to clean itself more readily, and that this class of slag is brittle and hence breaks up more readily in cleaning away the dump. Fluorspar is also the main component part of many special foundry fluxes.

Benedict Crowell in the *Engineering and Mining Journal*, Jan. 21, 1922, made the statement which follows: It is not generally realized that the known fluorspar deposits of this country are very limited in extent. War stimulation failed to develop a single new ore body of consequence, that I know of. The increased supply in 1917 and 1918 came from the exhaustion of reserves at the principal mines, depletion of all old and newly located shallow deposits, working over old dumps, and salvaging the low grade ore left in the old workings of abandoned mines. Prices of \$35 to \$60 per ton justified extreme activity.

Production and Prices

Production of fluorspar in the United States was first reported in 1883. Years of normal production are:

	Tons
1883	4,000
1892	12,250
1900	18,450
1905	57,385
1910	69,427
1915	136,941
1920	186,778

The largest shipments, due to previous war demands, were 263,817 tons in 1918 to which add 12,572 tons imported in that year. In 1921 shipments dropped to 34,960 tons due to large stocks and depression in the steel business.

English production has averaged for the last eight years about 50,000 tons annually. Exact German production reports are not available, but indicate about 8000 tons annually, and should show much larger for 1921 and 1922.

The highest average prices realized for fluorspar at mines including shipments made on old low-price contracts were:

1918	\$20.72 per ton
1919	25.49 per ton
1920	25.26 per ton

Basic open-hearth steel production at 5-yr. intervals shows:

	Tons
1900	2,545,091
1905	7,815,728
1910	15,292,329
1915	22,308,726
1920	31,375,723

As indicating the consumption of fluorspar for these years gravel fluorspar was produced in the United States as follows:

	Tons
1910	52,013
1915	114,151
1920	154,786

No records were kept of importations when fluorspar was on the free list, prior to August, 1909, but for subsequent years imports were as follows:

	Tons
1910	*42,488
1915	7,167
1920	24,612

*Largest on record.

Of the 1920 imports England furnished 17,096 tons, Canada, 7086 tons, chiefly from British Columbia, and Germany, 407 tons.

Fluorspar was on the free list until August, 1909, when a duty of \$3 per ton went into effect. This was reduced to \$1.50 per ton, October, 1913. The present duty of \$5.60 per ton is in the new tariff of September, 1922.

A rough estimate shows consumption as follows:

	Per Cent
Steel ingots and castings.....	80 to 85
Glass and enameling.....	7½ to 10
Hydrofluoric acid.....	5 to 6
Foundries.....	1 to 2
Miscellaneous.....	2

[Geological and mining features are discussed in the concluding portion of the paper.]

Coal and the Steel Industry

Practicability and Methods of Storing Bituminous Coal—Modern Methods of Mining

TWO papers on the coal industry were presented, covering certain phases bearing on the steel industry.

One was entitled, "The Storage of Bituminous Coal," by H. H. Stoeck, professor mining engineering, University of Illinois, Urbana, Ill., and J. V. Freeman, director, Coal and Coke Research Laboratory, United States Steel Corp., Joliet, Ill. The authors discussed the practicability and disadvantages of coal storage and the physical and chemical changes in stored coal. The requirements of an ideal storage plant were outlined together with a classification of the common methods of storing. According to the authors, the iron and steel industry consumes about one-fifth of the bituminous coal produced in the United States, or about 100,000,000 tons per year. As large consumers of water, gas and electricity, steel companies are directly interested in public utilities.

The other paper, "Modern Methods of Mining Coal," was by H. Foster Bain, director Bureau of Mines, Washington. An interesting moving picture of some phases of present day mining was a distinct addition to the author's presentation. The author's summary and conclusions are as follows:

In bituminous mining there has been a decided improvement in the development of methods during the past 25 yrs. Changes in labor supply and the increasing cost of coal require a more general adoption of better methods.

The application of engineering knowledge has been of great advantage in securing a high recovery of coal, increase in safety and decrease in cost.

Concentration of work and supervision especially are in the interest of greater safety and of coal recovery.

More extensive introduction of machinery underground is to be anticipated, but it will be necessary to change mining methods in order to realize the full economy of the machinery.

Irregular working is one of the most serious handicaps to be met in improvement of practice and can only be expected to be eliminated in part.

From the standpoint of economy of operation, high recovery of coal, and the control of conditions that affect safety, the close adherence to a well-thought-out plan adapted to the local conditions is a first obligation on operators and managers.

In many localities much coal is being lost beyond the possibility of future recovery and the time may come when the States will levy a tax penalty on coal that is unnecessarily left in mined-out areas.

STEEL IN SOUTH AFRICA

Union Steel Corporation Installing New Open-Hearth Furnace and Rail Rolling Mill

Steel production in South Africa is making considerable progress, according to a report to the Department of Commerce from Trade Commissioner Stevenson, though not as much as had been expected.

The Union Steel Corporation (of South Africa), Limited, Mr. Stevenson says, is by far the most important factor in the industry, its 1921 production being 14,434 tons of a value of £361,468. The greater part of the output, or 11,573 tons, consisted of open-hearth steel made from scrap materials, while 2861 tons were made in a 3½-ton Heroult electric furnace. A new 22-in. mill is being installed to roll heavier sections of angles, channels, girders and similar products from 20 to 30 lb. per foot, and rails up to 60 lb. per yard. A new 25-ton Siemens open-hearth furnace has been erected and when in full working order the capacity of the works will be 30,000 tons a year. The Union Steel Corporation has already supplied a large part of the reinforcing steel contract for the Government grain elevators, and has rolled a few rails which have been purchased by the South African Railways for trial purposes.

The Dunswart Iron & Steel Works, Limited, turned out 5355 tons of iron, valued at £123,165 in 1921. A new 3-roll high 18-in. cogging mill is in the course of erection. It is intended later to manufacture steel castings up to 7 tons.

The Witwatersrand Co-operative Smelting Works, Limited, has erected a new plant at Driehoek, to which the old equipment is being transferred. The capacity of the new plant will be 4500 tons per annum. The 1921 output was 1296 tons of shoes and dies, worth

£25,900, as against 1201 tons in 1920, valued at £24,020.

The South African Iron & Steel Corporation, Limited, at Pretoria, was able to operate only during the first four months of 1921, the output being 1148 tons of pig iron, valued at £11,480, which was slightly below the 1920 figures. The Newcastle Iron & Steel Works, Limited, during the year completed its plant, which includes one blast furnace of a daily capacity of 175 tons, two Cowper stoves, two blowing machines, and brick-making machinery. Both of these companies, which were formed to exploit local ores, are unable to operate, due to lack of capital. The only plants operating on any commercial scale utilize scrap.

It would appear, Mr. Stevenson concludes, that the local industry has not as a whole made the progress that was anticipated, even allowing for the depression period. Whether the new iron and steel industry encouragement act will prove sufficiently attractive to interest capital is open to some question.

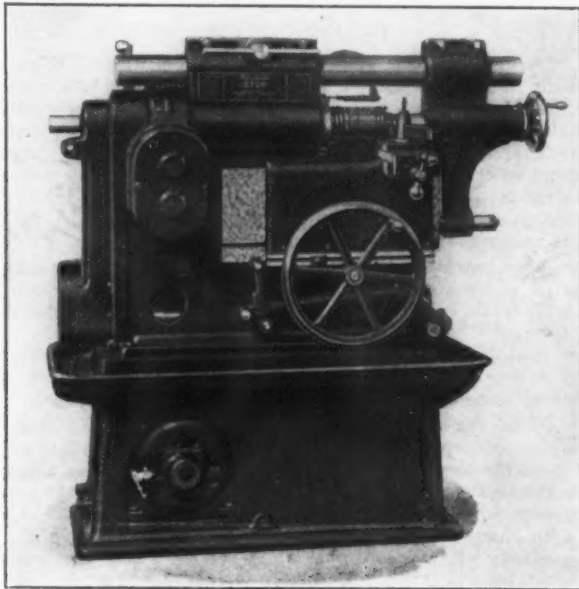
The Western Screw Products Co., St. Louis, whose plant was recently destroyed by fire, has secured new properties located at Main and St. George streets, that city. Its new plant is being equipped with modern machinery, some of which is still en route. If the present plans are consummated, production will begin about Nov. 15. The range of capacity will be enlarged to produce screw machine work up to and including 2½ in. diameter.

Of all the typewriters imported into Australia, about 95 per cent are of American manufacture, according to Trade Commissioner Sanger of the Department of Commerce.

Stub Lathe for Piston Turning

The Sundstrand stub lathe, shown in the accompanying illustration, has been added to the line of manufacturing lathes of the Rockford Tool Co., Rockford, Ill. Although designed primarily as a piston turning machine, many other jobs, such as turning automobile wheel hubs, gears, steering knuckles, pulleys, bushings, etc., may be handled with equal advantage. One operator can operate two machines, and on some work, three machines.

The swing over the carriage is 8 in. and the maximum capacity between centers, 12 in. The carriage ways and headstock are in one casting to assure rigidity under heavy cuts. The spindle is unusually large and runs in phosphor bronze taper bearings lubricated with wick feed from an oil reservoir supplied through sight



Stub Lathe for Turning Pistons, Pulleys, Gears and Other Pieces. One man can operate two machines and, on some work, three machines

feed oil cups. Take-up for both bearings is by means of a single nut at the rear of the spindles. The spindle is driven by a heavy bronze wheel and worm provided with ball-bearing thrust and geared to 3 to 1 reductions. Six spindle speeds, 40 to 145 r.p.m. are provided. Provision is made for mounting an air cylinder and a quick acting draw back.

The feed is driven from the spindle by a chain and pick-off gears at the headstock end, six feeds, from 0.020 in. to 0.090 in. per revolution of the spindle being available. The feed arrangement to the carriage and rear tool is simple, being driven by worm through a large worm wheel. The worm is submerged in oil, and to engage the feed is lifted into the worm wheel by a handle at the front of the machine. The worm wheel is keyed on the pinion shaft that drives the carriage, no gearing being required in the apron. A 15½ in. hand wheel is on the pinion or worm wheel shaft.

The tripping mechanism consists of a dog on the carriage which trips the feed lever and automatically disengages the worm from the worm wheel. This is said to provide a reliable and accurate knockout, and especially dependable when working to shoulders or facing to close diameters. The carriage is 18 in. long with full length bearing surface on an 8-in. face at the front of the bed and a 4-in. angular surface on top. An angular gib is provided at the bottom of the carriage to take up wear. The front tool slide is equipped with stop screws for tool adjustment and several tools can be clamped on the slide at one setting. A rear tool having a 4-in. in-and-out travel and ample sideway adjustment is provided.

The tailstock is heavy and is clamped to the overhanging arm and supported by a stud protruding from the bed. A large diameter screw with a lead of 1½ in. to each revolution of the tailstock handwheel is provided. The spindle has a longitudinal adjustment of

5 in., and its bearing is split the full length and held in position by screws which may be adjusted to the wear of the spindle. The overhanging arm is 3½ in. in diameter and arranged so that tools can be clamped on for doing several operations. Adjustment is easily made by means of a rack and pinion, a rack being cut on the overhanging arm.

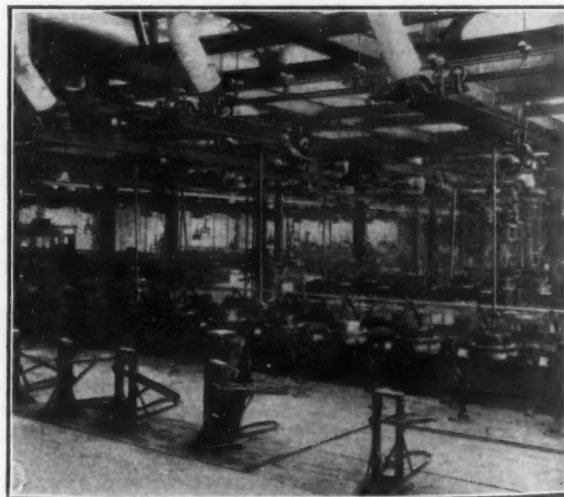
A 5-hp. 1800 r.p.m. motor is employed, being fastened on a pivoted frame or plate inside of the bed. A friction clutch pulley at the rear is mounted on roller bearings and the starting handle is conveniently located. The oil pump is driven from the main drive friction pulley, the tank for cutting coolant being located in the bed, below the chip pan. The floor space occupied by the lathe is 33½ x 46½ in., and the net weight, with motor, is 3000 lb.

Tramrail Cranes in Use at Wire Mill

An installation of 57 tramrail cranes and 80 carriers with electric hoists, said to be the most complete installation of its kind in the country, has been placed in use recently at the plant of a Western wire mill. The equipment is used for removing the coils of wire from the blocks on which the wire is wound after drawing. There is said to be more than a mile of track used in connection with this system.

The accompanying illustration shows the arrangement of the wire draw-blocks and the tram rail system overhead. There are several of these hoist equipped cranes on the same runway over the coiling reels, and as the hoist has a transverse movement on the crane girder the load may be moved both longitudinally and transversely.

A rigid arm extends from the crane to within 4 ft. of the floor and at the bottom of this arm are two push buttons that control the hoist. With this control the crane operator controls the up and down movement of the hoist with the push buttons, and with the same hand propels the crane in any direction, using the other hand to steady and guide the load. The cranes are equipped with a double row of ball bearings on every wheel and



Tramrail Cranes with Hoists for Handling Coils of Wire from Draw Blocks

run on high carbon steel rails, which is intended to facilitate operation.

The crane, tramrail and hoist equipment was built by the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

A joint meeting of the Cincinnati section of the American Society of Mechanical Engineers, the Society of Industrial Engineers and the Taylor Society was held in Cincinnati Oct. 24 and 25. The principal speakers at the sessions were E. A. Muller, vice-president King Machine Tool Co., Cincinnati, C. U. Carpenter, Dayton, Ohio, and H. J. Plogstedt, Fifth-Third National Bank, Cincinnati.

NEW INTERNAL GRINDER

Automatic Unit Eliminates Hand Plugging—Gaging Mechanism and Other Features Outlined

The Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has developed the machine illustrated for the internal grinding of various automobile and machine parts automatically, entirely eliminating hand plugging by the operator. An outstanding intention of this design is to provide equipment that practically will eliminate the skill required of operators at present, and also to provide a machine which will grind a hole to the finish size with the minimum of waste.

The new machine, designated as the No. 12, is motor-driven, completely self-

contained, and is equipped with push button control. Six work spindle speeds have been provided, and are selected by turning the hand wheel on top of the workhead to any of the six indicated positions. The spindle is of large diameter and runs in large adjustable bronze bearings. Ball bearings are provided on the power transmission line to the spindle. Among other features it may be mentioned that the workhead is mounted in a

circular bearing on a cross slide which permits the grinding of tapers to an included angle of 30 deg. Quick and accurate indexing has been provided. The collet chucks are operated by draw bar and hand wheel.

An automatic gaging mechanism has been incorporated for the purpose of eliminating hand plugging. After the operator chucks the piece and starts the feed, the machine will grind to the finished size, automatically trip the carriage which returns to the rest position. This device has been designed to allow for wheel wear. The initial cost of the bar gages used is said to be less than half the cost of plug gages, and the life of the gages prolonged as they revolve at work speed and the finishing gage enters the work at once.

The wheel carriage is of an unusually heavy and unique construction, having large bearing surfaces on the ways of the bed and being guided by Vees on both sides. The carriage is reciprocated hydraulically. The motor for driving the wheel spindle is mounted directly beneath the wheel carriage and reciprocates with it. Bearing surfaces are protected from abrasive material.

The grinding wheel spindles are mounted on ball bearings in the wheel head, which are tapered on the outside and mounted in a corresponding taper in the wheelhead housing, being fastened in place by a lock nut. This mounting is intended to permit of easy attachment and removal. Coolant is forced through the center of the spindle to the work by a centrifugal pump, and means for automatically cutting off the water when the wheel leaves the work and also for turning on the water as the wheel enters the work have been provided.

Feeding of the work against the wheel takes place at the end of the stroke. Two separate series of feeds have been provided for, ten roughing and five finishing. Both feeds are controlled by use of two gages, a roughing gage and a finishing gage. When the roughing gage enters the work the roughing speed is automatically cut out. The finished speed automatically engages until the finishing gage enters the work when the trip on the carriage automatically operates, returning the carriage to its rest position.

A special gear scroll chuck having a holding ca-

capacity of $\frac{1}{4}$ to 10% in., designed by the Cushman Chuck Co., Hartford, is part of the standard equipment. It is of water-tight construction, and all operating parts are protected against grit; the body is filled with grease. The body is of steel, all working parts are hardened. The total swing over the ways is 13 in., the size of the holes ground is $\frac{1}{4}$ to 10 in., and the depth ground, 9 in. The maximum travel of the wheel carriage is 20 in. The floor space required is 7 ft. x 4 ft. 2 in. The weight is 4400 lb. net.

England Looks to 1923 as Approach to Normal

Richard Knight, manager of the foreign department of the McClintic-Marshall Co., 50 Church Street, New York, who recently returned from a trip abroad, says that England is apparently a year behind the United States in a return to normal conditions. To-day British business is looking forward to 1923 as a year of more nearly normal conditions, much as American business regarded 1922. It is generally conceded, he says, that the beginning of 1923 will probably see a reduction of labor costs.

The labor situation in England is not satisfactory, and the unemployment payments by the Government, known as "doles,"

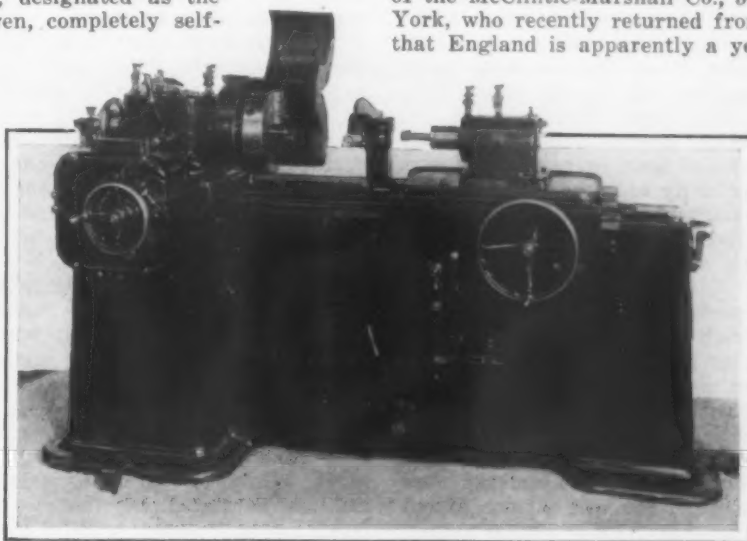
in many instances fail to operate as intended. When a worker is able to obtain work for two days a week, which is sufficient to remove him from the Government's unemployed payroll, he finds that he can obtain more money from the Government than he can by working part time.

Mr. Knight said that British costs are in practically all cases higher than the American prices, in some instances, such as on plates and shapes, at the time he was in England, the base prices, f.o.b. works, were equivalent to the f.o.b. Pittsburgh price in the United States. At the various plants he visited the dearth of automatic machinery and labor-saving devices, says Mr. Knight, were noticeable. He spoke particularly of one concern which was cutting out the corner on steel plates, a result that would have been obtained in one operation in an American plant. After cutting the square corner, some time was spent in machining.

Southern Sheet Steel Co. Plans

BIRMINGHAM, ALA., Nov. 6.—There is no definite statement forthcoming as to progress made in financing the Southern Sheet Steel Co., Chattanooga, which plans a \$1,500,000 sheet steel mill. It is understood that citizens of Chattanooga are to be asked to raise \$250,000, that an outside firm in Cleveland will underwrite \$250,000, the rest to be secured at large. W. J. Lynch is vice-president and general manager.

The Alloy Electric Steel Casting Co., Warren, Ohio, expects to have its new plant in operation early in the year. The company will make alloy steel castings using both the open-hearth and electric furnaces. The main building will be 118 x 280 ft. and will include the melting department, molding floor, cleaning room and core room. A 15-ton open-hearth furnace will be installed. The company has a capital stock of \$450,000. H. L. Coxey is president; Herman Vogt, vice-president; A. F. Rauck, secretary, and O. R. Grimmesy, treasurer.



Automatic Internal Grinder for Various Automobile and Machine Parts. Automatic gaging, eliminating hand plugging, is a feature. The chuck has a holding capacity of $\frac{1}{4}$ to 10% in., and is of special design.

INDUSTRIAL HEATING

Some Unusual Pronouncements at an Engineering Meeting at Newark, N. J.

Joseph A. Doyle, vice-president W. S. Rockwell Co., New York, addressed 100 members of the Metropolitan section of the American Society of Mechanical Engineers at the Downtown Club, Newark, Oct. 31, on industrial heating operations. The talk was illustrated with lantern slides.

Mr. Doyle enunciated a number of novel ideas, at variance with the usually accepted notions, regarding the use of B.t.u. comparisons of fuels, etc. He emphasized the fact that we should aim to utilize not only the energy value of a fuel, as expressed in B.t.u., but also and more particularly the commodity value, which involves not only the energy but also the value of position and of particular utility for the work to be done. As a specific instance of this he stated that, although a bituminous coal might cost only 17c. per million B.t.u., where electric energy would cost nearly \$6 for the same amount of heat energy, there were occasions where the electricity must be the choice because it would be necessary that the atmosphere produced by the consumption of the bituminous coal or other fuel be kept rigidly away from the product to be heated.

Except for the comparison of fuels of thoroughly similar characteristics, such as two kinds of coal or two kinds of relatively similar gases, etc., the speaker regarded the B.t.u. method of comparison as archaic and on a wholly unsound basis. As soon as a difference occurs in chemical formation of a fuel, there is a corresponding difference in economic value, which is the final basis for logical comparison. The same remarks were made with regard to the use of the heat balance, except as it might be employed between fuels of similar nature.

It was pointed out that much unnecessary worry is expended upon loss of fuel through poor combustion; while, as a matter of fact, there is far greater loss of fuel through waste of heat. Consequently, the latter is the point which should be made the target of attack. Another common sense point of view enunciated was that fuels alone should not be compared, but that rather the comparison should be between one fuel and the apparatus for its burning and another fuel and its apparatus. Even this is not carrying the matter quite far enough, for beyond the apparatus must be considered the object to be treated and the method in which it is handled while in the apparatus. In other words, the economic problem should be the goal of our effort, rather than the mere technology of combustion. The quality and cost of the ultimate product or service are the two deciding factors.

Another point made by Mr. Doyle was the fact that the time element, in its true relation to the economic aspect of the problem, is usually carefully excluded. In this is involved properly a study not only of the mass of the steel to be heated, but also of the exposed surface of that steel which can receive the heat imparted by the fuel, and again the loading of the furnace as an index to the rapidity and uniformity with which the steel can be heated. Thus the question is not merely one of temperature but is much more complex.

By-product coke ovens manufacturing coke and the various coal derivatives are regarded by Mr. Doyle as an economic fallacy, except where coke is definitely sought. He argued for the installation of a group of industries close alongside, so that a by-product plant might be used in conjunction with a gas plant distributing to domestic and industrial customers and a chemical plant for utilizing many of the by-products of the coke plant. Only by such an intimate inter-relation of utilities, he stated, can the by-product plant be made into a really useful member of society.

Meetings of Mechanical Engineers

Among meetings of local sections of the American Society of Mechanical Engineers scheduled in November are the following:

- Nov. 14, Chicago, J. D. Cunningham, 2240 Diversey Boulevard, Chicago, secretary. Illustrated address at Engineers' Club on "Autogenous Welding as Applied to Unfired Pressure Vessels" by Harry Sloan, president of American Society of Refrigerating Engineers.
- Nov. 14, Metropolitan section, secretary, A. E. Allen, Westinghouse Electric & Mfg. Co., 165 Broadway, New York. Address at Engineering Societies Building on "United States Shipping Board Tests of Scotch Marine Boilers" by Carl Jefferson of the United States Shipping Board.
- Nov. 15, Plainfield section, secretary, R. H. Rausch, Niles, Bement, Pond Co., Plainfield. Address at Park Hotel on "A New Development in Internal Combustion Engines" by S. W. O'Neill, chief engineer Ingersoll Rand Co.
- Nov. 17, Baltimore section, secretary, Prof. J. C. Smallwood, Johns Hopkins University, Baltimore. Address at Engineers' Club on "Recent Developments in Power Plant Practice" by Prof. A. G. Christie, Johns Hopkins University.
- Nov. 21, Cleveland section, secretary, E. E. Blundell, Cleveland Automatic Machine Co., 2269 Ashland Road, Cleveland. Joint meeting with the American Society of Steel Treating and the American Institute of Mining and Metallurgical Engineers at Hotel Winton. Address on "Alloy Tool Steels" by Dr. John A. Mathews, president Crucible Steel Co. of America.
- Nov. 21, Providence section, secretary, W. A. Kennedy, General Fire Extinguisher Co., Providence. Joint meeting with the Providence Engineering Society in Providence Engineering Society's rooms. Address on "The Engineer and the Home" by Mrs. Frank B. Gilbreth, Montclair, N. J.
- Nov. 23, Boston section, secretary, C. R. Main, 200 Devonshire Street, Boston. Affiliated Technical Societies of Boston at Lorimer Hall, Tremont Temple. Subject: "Aviation—Present State of the Art, with Special Reference to the Development of Boston as an Air Port." Addresses: "Heavier Than Air Development," by Prof. Edward T. Warner of Massachusetts Institute of Technology; "Dirigible and Lighter Than Air Phase of the Situation," Edward Schildauer of American Investigation Corporation, Washington.

Nov. 23, Cincinnati section, secretary, Prof. J. T. Faig, Ohio Mechanics' Institute, Cincinnati. Address on "Die Casting" by Charles Pack.

Nov. 23, Bridgeport branch, secretary, A. E. Keating, American Tube & Stamping Co., 471 Hancock Avenue, Bridgeport. Address at Stratfield Hotel on "Individualism versus Socialism" by E. W. Carpenter, president E. F. Houghton Co.

Nov. 28, Atlanta section, secretary, E. A. Brooks, 702 Candler Building, Atlanta. Address at Town Hall, Chamber of Commerce, on "Diesel and Semi-Diesel Engines versus Small Steam Engines in Power Stations Up to 500 Kw." by R. H. Cunningham, southern representative of Ingersoll Rand Co., Birmingham. Discussion by R. B. Hall, Ames Iron Works, and W. H. Davidson of Fulton Iron Works.

Michigan Steel Corporation Will Build Sheet Mill

The Michigan Steel Corporation has been organized to build a sheet mill plant in the vicinity of Detroit, to specialize in the manufacture of high-grade automobile body and fender sheets. It is incorporated under the laws of New Jersey. It has opened temporary offices in the First National Bank Building, Detroit. The officers of the company are as follows: Frederick B. Lovejoy, Wheelock, Lovejoy & Co., New York, chairman of the board; George R. Fink, formerly with the West Penn Steel Co., Brackenridge, Pa., president and treasurer; Frank H. Jones, Worthington Pump & Machinery Co., New York, vice-president; Herbert M. Steele, formerly with the Newton Steel Co., Newton Falls, Ohio, vice-president. Further announcement of more definite plans will be made within the next week or ten days.

Miners' Wages Advanced

The Oliver Iron Mining Co., United States Steel subsidiary, has announced wage adjustments upwards for all employees retroactive to Oct. 1. The increase averages 20 per cent and affects over 12,000 workers. This is in line with advances by other subsidiaries.

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ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

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Living Wages

The Railroad Labor Board, in its decision in the maintenance of way case (Decision No. 1267, dated Oct. 21, 1922), made a definite statement of its attitude to "the living wage" that has been urged repeatedly upon the board. It distinguishes between "a living wage," which it asserts it has granted in all cases, and "the living wage" which has been defined by its proponents before the board as follows: "A wage which will support a family of five in health and reasonable comfort, such family being assumed to consist of a husband and wife and three dependent children under 16 years of age."

The supporting opinion of the board points out that according to the 1920 census there was an average of 4.4 persons per family, not five, and that dependent children under 16 years of age average 1.4 to a family, not three, also that for each family there are 1.36 male workers, not one.

The opinion considers the full demand made by the employees' representatives in this case, the one they claimed the board should endeavor to work up to, and shows that on the basis of 1921 revenue the carriers would have a deficit of \$2,241,639,518, while the temporary demand, proposed as a sort of stepping stone, would give them a deficit of \$378,078,125.

This matter of "the living wage" may also be considered from the broader viewpoint of the entire country. We have not adopted a principle that railroad employees, all things considered, should be better paid than other workers. Wages represent in essence a distribution of the production of the country. One receives wages in order that he may purchase his share of the goods and services that are available. As mentioned in THE IRON AGE of Oct. 19, in a discussion of the proportion received by the coal industry, the national income may be assumed to be running at about 55 billion dollars, while there are about 42,000,000 persons gainfully occupied. A fair distribution according to experience, likely to encourage creative intelligence and promote progress, is 70 to 75 per cent for wages and salaries and 25 to 30 per cent for capital and management, or, with 55 billion total, say 40 billion for wages

and salaries and 15 billion for capital and management.

What has been called "the living wage" is above \$2,500, but taking that figure, to give it uniformly to all those gainfully employed would be to make a payroll of 105 billion dollars. The money would be given and received for the purpose of being spent. It would be impossible to buy the goods and service represented, because they do not exist. There would be merely disturbance and confusion.

If workers are to receive more, if their standard of living is to be advanced, and all will agree that it is desirable it should be, the prescription is obviously not to juggle with dollars but to make more goods and services available so that existing incomes will buy more. That is to be accomplished by harder and more efficient work being done. Whenever and wherever a question comes up for settlement that involves efficiency, the settlement should be in favor of efficiency. When the public generally comes to realize that advancing wages and salaries from 40 billions to 100 billions will not enable the recipients to buy two and one-half times as much as the 40 billions have been buying, there will be a saner attitude toward this matter of "the living wage."

Yet another use for chromium has been developed, it is reported from Sheffield, England. According to the London *Ironmonger* a new method of electroplating by the deposition of chromium on various metals has been perfected. For some years experiments have been under way in Germany and in England to find a plating solution from which chromium could be deposited electrolytically. If the Sheffield claims are well founded this new process is likely to be of considerable importance industrially and to modify present electroplating processes. It is evident that because chromium is a very hard metal, harder than any of those now used for plating, its successful deposition on steel may mean a cheaper stainless product or one less difficult to make and fabricate than stainless steel itself, at least in such forms as cutlery and ornamental objects. The success of the new process would add one more to a long

list of uses which have conferred an unusual distinction upon chromium.

Steel Institute Leadership

The recent New York meeting of the American Iron and Steel Institute brought out in strong light that part of its work which has to do with the production of a literature of iron and steel works practice in the United States. More than once the comment has been made that the industry has been fortunate in Judge Gary's long-continued relation to the institute as "dean of the faculty." Judge Gary and his associated directors in the institute have the final word in making available the results of the excellent work on important metallurgical problems that are engaging their technical staffs. The engineering societies, on the other hand, have a relatively small number of the leaders of the industry in their membership, and in the past the consent of executives has not been always so easy to get, for the publication of results of research, as the conditional consent of operating men directly connected with the work.

Most of the nine papers read at this last meeting of the institute bore on problems immediately exercising iron and steel manufacturers. The steel industry had been through the greatest coal strike in its history. Modern methods of mining coal and storage of bituminous coal—the latter question thrust to the front by proposals for curing the seasonal stagnation in coal mining—were treated by highly competent men. Fuel economies have been studied as never before, in view of high transportation cost and the high price of coal, jointly due to profiteering by miners and operators. Hence the papers on liquid fuel in steel making, heating furnace performance in semi-finished steel, economic operation of steel works power plants, and thermal efficiency of the open-hearth furnace. This last paper may be called the American response, with its design for a proposed 100-ton open-hearth furnace, to the paper before the Iron and Steel Institute (London) last May, with which the author gave a design, also for a 100-ton furnace, based on the best British practice.

The status of the electric furnace in iron and steel refining, the steel requirements of the automotive industry, and the position of fluorspar mining in the United States were treated in papers which heaped up the measure of the most notable of iron and steel convention programs outside of an international meeting.

In its beginnings ten years ago the American Iron and Steel Institute seemed to justify the prophecies that it would concern itself with the commercial rather than the technical side of the industry. Thus there were papers on contract obligations, export trade, cost standardization. But such discussions are heard no more. The institute has found a place, and occupied it as no other organization has done, as a producer of the most detailed and practically valuable literature extant of latter-day methods in the production of iron and steel.

It may surprise some observers to learn that Luxemburg is now more of a factor in the output

of steel in Europe than was the case before the war. Under the economic control of Germany in 1913 that little country produced steel at the rate of 109,000 tons per month. In recent months the output has expanded until for June, July and August it averaged 125,400 tons. This exceeds the record of Belgium for the same period; for the first eight months the excess in favor of Belgium is very slight. The United States is the only other country that is now exceeding its 1913 rate of steel production. Before the war the Luxemburg iron and steel industry was swallowed up by Germany and operated for the greatest benefit of the German industry, particularly for its pig iron production. To-day, unhampered, it is practically on a footing with Belgium.

Oxygen in Steel Metallurgy

We may not have long to wait for a commercial test of the value of oxygen-enriched air in metallurgical operations. Announcement was made in THE IRON AGE last week that the Bureau of Mines plans for two lines of investigation of such an enrichment process, to learn whether it will increase the efficiency of smelting operations with the resultant production of metals at a lower cost and, perhaps, permit the use of lower grade ores. The blast furnace is to be one object of study.

Cosmo Johns of Sheffield, England, recently discussed the same subject, his remarks appearing in abstract in another column. He says it is not pure oxygen that is required but an enrichment of the air to between 20 and 40 per cent of oxygen; "not pure oxygen in steel flasks but enriched air in hundreds of tons." Under such conditions he believes the modern blast furnace would undergo a startling change; that hot blast stoves would probably disappear; that the Bessemer converter would be rendered more efficient and the character of the process changed; that the low thermal efficiency of the open-hearth might be improved, and that it even might be worth while to make producer gas richer in carbon monoxide.

The realization of these radical changes has been predicted before. The drawback has been the production of oxygen at a low enough cost. One object of the new research by the Bureau of Mines is to devise a way to produce highly oxygenated air more economically. The original contentions of Dr. F. G. Cottrell and the late J. E. Johnson, Jr., may yet be realized.

British Steel in Shipbuilding

It is not generally realized to what extent the demand for steel for shipbuilding purposes controls the output of British steel plates and shapes. Disregarding such abnormal conditions as have obtained in the last two years, the records of several previous years, back as far as 1913, show 20 per cent or more of the total British output of steel used in the making of shipbuilding materials. In 1913 it is estimated that 1,854,700 tons of steel was required for this purpose. This figure was exceeded in 1920, when, it is estimated, 1,963,700 tons of ingots and castings went into shipbuilding material.

Figures for other years are given in a compara-

tive table, which shows the great slump in steel demand for shipbuilding during the first two years of the war and the heavy increase in the years which followed. The table shows also that in 1921, during the period of light production of steel in Great Britain on account of strikes, more than 40 per cent of what was actually produced was used for

Steel Consumed in British Shipbuilding				
Year	Vessels Launched, Gross Register Tons	Steel Ingots Required, Gross Tons	British Output of Steel Ingots and Castings, Gross Tons	Proportion Used in Shipbuilding, Per Cent
1913.....	1,932,000	1,854,700	7,663,876	24.2
1914.....	1,684,000	1,616,600	7,835,113	20.6
1915.....	651,000	625,000	8,550,015	7.3
1916.....	608,000	583,600	8,991,729	6.5
1917.....	1,163,000	1,116,500	9,716,514	11.4
1918.....	1,384,000	1,328,600	9,539,439	13.9
1919.....	1,620,000	1,555,200	7,894,000	19.7
1920.....	2,056,000	1,973,700	9,067,300	21.7
1921.....	1,538,000	1,476,500	3,625,800	40.7
1922*.....	500,000	480,000	2,612,200	18.0

*First six months, estimate.

shipbuilding purposes. The general average, over the period of 9½ years, was 16.7 per cent. The figures, from a report of the United States assistant trade commissioner in London, deal with merchant shipping only.

Comparative figures for the United States show far lower proportions of the steel output used for shipbuilding. Even with the tremendous American construction of merchant ships in 1918, 1919 and 1920—construction which, in each of those three years, was greater than any other nation ever made in any year and in one of them (1919) greater than any other nation ever made in two years—only 7.6 per cent of the American steel output was devoted to shipbuilding. The one year 1919 showed 11.3 per cent, the highest proportion in the history of steel ship construction in the United States.

The Country as a Business Enterprise

The greatest thing that was destroyed in Russia was the business organization. Plants can be built or rebuilt, raw materials can be secured, workmen can be found or trained, provided there is adequate organization; but without organization nothing can be done. At the time of the armistice the United States had plants, workmen and materials, but our greatest asset was our organization.

We are not now using our organization to advantage. Between some departments there is lack of co-operation, between others there is hostility if not actual strife. In view of the conditions in which civilization at this time has elected to live, it is right, it is not sordid, to consider this country as a business enterprise.

Looking upon the country as a business enterprise, we have these conditions: A part of the organization is complaining that there is not enough labor to do our work. A part of the organization refuses to allow others to be employed to work for us, by our importing the goods they make. A part insists that the debts due the organization, partly by foreign governments to this Government, partly by foreign individuals to our traders and bankers, be paid eventually and be subject to interest meanwhile. A part insists that we must not accept, against interest or principal, the only thing that can be offered, which is goods.

It is not necessary for the present argument to

take sides in that debate. Let the matter of the principal be ignored and only the annual interest be considered. As indicated in what THE IRON AGE has said on this subject, the total due us, public and private, is not far from 20 billion dollars. The annual interest would be nearer a billion than a half billion. Movement of securities, American or foreign, has been suggested, but such a process could not be kept up to meet interest requirements indefinitely. By the same token, remission of interest for a time would represent merely a postponement of settlement.

It is not necessary that at this present time any man or group of men decide how these divergent pulls should be harmonized—the complaint of labor scarcity, the unwillingness to import the products of labor, and the insistence that debts be paid when the only payment that can be offered is refused. We are not so quick as we once were to say that if anything is wrong the thing to do is to “pass a law.” Our experiences in the war and since have taught us that that process can be overdone, and we are rather more willing to let time and events work out our troubles than take our chances with more legislation.

We have had reason to believe, moreover, that legislative expedients for correcting what is awry in our great business enterprise do not always represent the will of the majority. In a number of respects we have control by organized minorities, seeking individual ends either through selfishness or lack of broad knowledge. We do not now realize as we should how many of these organized minorities there are. The American Federation of Labor is readily identified as one. The agricultural bloc is another. There are many well organized propaganda agencies at work throughout the country and of these the Socialist minority is perhaps the most active. And why omit Congress itself? It is not in touch with the real business of the country, and has grown particularly out of touch by the long sessions of these recent years.

CORRESPONDENCE

Friendliness as a Factor in Extending Export Trade

To the Editor: It has been said that American manufacturers in many instances have not appreciated the factor of personal friendship in their foreign trade. Henry H. Morse, chief of the Specialties Division of the Department of Commerce has said that the relationship between the seller and the buyer in our overseas business has passed from the realm of strict business to that of friendly business.

Business nowadays is conducted on a basis very different from that of 20 years ago, even of 10 years ago, and the evolution is still going on. A letter file of 1900 tells the story of the change most strikingly. Business letters used to be cold; the colder the letter, apparently, the better it was considered by its writer. Friendships, of course, counts for a great deal. It does not often get orders in itself alone. But it puts the seller on a footing with the buyer, where he is much more apt to get the business than his competitor who has failed to acquire this relationship.

American manufacturers who occasionally visit among their trade abroad, whether in Europe or South

America or the Far East, have learned this in relation to foreign customers. The interchange of courtesies often brings a complete change in the atmosphere of correspondence. There is a friendly note in it. Each is glad to help the other. For example, a first hand source of information to which a business house feels free to turn, perhaps as to business conditions or as to the standing of a prospective customer, may be worth a great deal. Then, too, it is no small asset to have friendly words spoken for the firm in another country where there may exist that indefinable something which separates business men of different nations.

But such business friendships must come naturally. At the same time one must appreciate the need of taking thought. In this connection a paragraph of Mr. Morse's article in *Commerce Reports* gives food for reflection:

People are human wherever we find them. They like us or they dislike us, and usually they are ready to like us if we give them the least encouragement. This can be done by expression of friendship in a letter, or by sending a cablegram at the time of a catastrophe, or at a time of good fortune. Before the United States went into the war many export managers got much closer to their Italian customers by cabling congratulations when military victories were reported. The same thing has been done by sending cablegrams of inquiry regarding a customer's safety at the time of an earthquake or a tidal wave. In a less spectacular way an interest may be shown by referring, after a considerable lapse of time, to personal items that have crept into a customer's letter. So simple a thing as a postal card mailed from some resort where an export manager is spending a week's vacation is enjoyed by a customer in a foreign land. Inexpensive souvenirs, the sending of a non-business letter by someone not connected in a business way with the manufacturer, tend to draw the seller and the buyer closer together. As in all matters of etiquette, reason must rule, but where attentions of this kind are shown graciously, where they are genuine, the results are gratifying and permanent.

To attempt deliberately to establish such a contact with customers as a business policy would require more than a common amount of business and social tact in order to achieve results. That sort of thing must develop out of actual good fellowship. But the easiest of all things is to compel a friendly wording of letters throughout an organization. An export manager—as for that, any manager—would not be wasting the time devoted to looking over carefully the letters which go out from his subordinates and eliminating such mannerisms as sometimes creep in, perhaps even to touch the customer on the raw.

JOHN NELSON.

Worcester, Mass., Nov. 1, 1922.

Burning Mine Culm and Waste

To the Editor: I am much interested in the article in THE IRON AGE of Aug. 24, page 467, entitled "Burning Mine Wastes" and giving description of a test from ash and low volatile fuel in pulverized form in a French boiler plant.

Your attention should be called to the fact that similar fuel has been burned in pulverized form quite extensively in this country for the last two or three years, using practically dust and culm mine dirt, etc., from anthracite coal. The largest equipment, which is supplied by six Fuller pulverizing screen mills, is for twelve 500 and 600-hp. boilers of the water-tube type operating a 10,000-kw. electric power station. It has been in successful operation over a year and a half and the owners are so well satisfied that they contemplate building another similar plant in a different locality which will also use the same class of fuel. The efficiency of boiler and furnace of 80 per cent and over is maintained regularly, from the B.t.u. in the coal as fired, when developing 150 to 200 of boiler rating.

The details given in your article are not altogether consistent and the statements are rather misleading unless they are clarified to such an extent as to make them more definite. For instance, in the fourth paragraph, you state that average evaporation per pound of fuel is 7.38 lb. of steam, which corresponds to an overall efficiency of 82 per cent boiler and furnace. Figuring backward, based on the B.t.u. in the coal of

10,728 per lb., 82 per cent boiler and furnace efficiency would give an evaporation of 9.06 lb. from and at 212 deg. Fahr. On the other hand, if the evaporation you give as 7.38 lb. of steam is from and at 212 deg. Fahr., this would mean only 66 per cent boiler and furnace efficiency. As the feed water temperature during the test and the boiler pressure are not given, it is difficult to interpret correctly the figures given.

If the statements could be elaborated to bring out the actual facts of the operating conditions, it would add to the value of the information given.

FREDK. A. SCHEFFLER.

Manager Power Department, Fuller Engineering Co.
New York, Sept. 19, 1922.

GERMAN PRICES JUMP HIGHER

Advance Faster Than the Mark Falls—Wolff Trust Dealing with Moscow

(By Cablegram)

BERLIN, GERMANY, Nov. 6.—Inflow of orders for steel is unchecked, but shortage of working capital locally hampers production. Only the sheet market is dull. Foundry iron No. 1 is now 83,994 m. per metric ton (\$14.40 per gross ton at 111/16c. per 100 m.). Ingots are 96,700 m. (\$16.58); bars, 132,000 m. (1.01c. per lb.); thin sheets, 196,000 m. (1.50c. per lb.).

Otto Wolff trust has signed the Moscow agreement creating a metal trading corporation in which the Soviet State is a partner. The trust undertakes to grant wares credit to the extent of £750,000 (\$3,345,000) and a further £500,000 (\$2,230,000) loan to the Russian State.

[The prices quoted above may be compared with those of mid-October given on page 1256. They replace 40,176 m. (\$9.70) for foundry iron on Oct. 23; 59,470 m. (\$14.35) for ingots; 81,200 m. (0.94c. per lb.) for steel bars, and 120,680 m. (1.40c. per lb.) for thin sheets. Attention is directed, further, to the table on page 1021, Oct. 19, showing the principal changes in these four products since April 1.]

The Gregg Pump Co., Kansas City, Mo., is moving to Kalamazoo, Mich., and has leased with privilege to purchase a building, owned by Fred J. Crockett, of the Star Brass Works. The structure contains about 12,500 sq. ft. of floor space and is being entirely overhauled to house the new industry. Walter S. Gregg, president of the concern, expects to be running by Dec. 1 and will employ at the outset from 30 to 40 men.

COMING MEETINGS

November

National Personnel Association. Nov. 8, 9 and 10. Annual convention, William Penn Hotel, Pittsburgh. W. J. Donald, 20 Vesey Street, New York, managing director.

Machine Tool Section of the National Supply and Machinery Dealers' Association. Nov. 21. Fall meeting, William Penn Hotel, Pittsburgh. Thomas A. Fernley, 505 Arch Street, Philadelphia, secretary.

National Founders' Association. Nov. 22 and 23. Fall meeting, Hotel Astor, New York. J. M. Taylor, 29 South LaSalle Street, Chicago, secretary.

December

American Society of Mechanical Engineers. Dec. 4 to 8, inclusive. Annual meeting, Engineering Societies Building, 29 West Thirty-ninth Street, New York. Calvin W. Rice, secretary.

National Exposition of Power and Mechanical Engineering. Dec. 7 to 12, inclusive. Grand Central Palace.

IMPORTS GREATEST IN 30 YEARS

More Than 76,000 Tons of Iron and Steel, Including 46,839 Tons of Pig Iron

WASHINGTON, Nov. 7.—The rush to get imports into American ports before the Fordney-McCumber tariff act went into effect at midnight, Sept. 21, is plainly reflected in the official figures. They show that from Sept. 1 to Sept. 21, inclusive, imports of iron and steel products reached the comparatively large volume of 76,393 gross tons, valued at \$4,835,887, as compared with only 12,825 tons valued at \$2,127,895 for the entire month of September 1921. The figures presented for September this year cover only the period up to Sept. 21, because that marks the end of the Underwood-Simmons tariff law. The next figures on imports will cover the remaining period in September, together with imports for October.

As was to be expected, the most interesting import figures in September related to pig iron and ferromanganese. Imports of pig iron totaled 46,839 tons while imports of ferromanganese totaled 10,718 tons for the three-week period. For the nine months ending Sept. 21 imports aggregated 301,987 tons, valued at \$30,566,739. Of these imports, 109,171 tons consisted of pig

largest in over 30 years, were greatly in excess of 50 per cent of the export movement and represented an increase of about 52 per cent over the imports in August, which totaled 50,050 tons.

Manganese ore imports likewise showed a sharp increase and totaled 46,869 tons, valued at \$347,916, the movement of this ore being 30 tons in excess of the pig iron movement in September. Imports of iron ore in September totaled 127,838 tons.

Distribution of Iron and Steel Exports

Canada, taking 41,417 tons, or nearly 30 per cent of the total September exports of iron and steel from the United States, had a long lead over Japan, which stood second, with 22,328 tons. Specific destinations for 122,698 tons, shown in the table, show that 75,920 tons, or 62 per cent, went to the Western Hemisphere (19,676 tons to South America) and 46,778 tons to the Eastern Hemisphere (35,403 tons to Asia).

The following are the chief countries of destinations of September steel exports, stated in gross tons:

Canada	41,417	India	2,969
Japan	22,328	Australia	2,403
Cuba	7,656	Colombia	2,303
Mexico	6,193	Philippine Islands	2,224
Brazil	6,133	Peru	1,562
China	5,689	Rumania	1,463
United Kingdom	4,306	Venezuela	1,304
Chile	4,229	Hong Kong	1,074
Argentina	4,145	British South Africa	979
Chosen (Korea)	3,403	Panama	978

	Imports of Iron and Steel in Gross Tons			
	September		Nine Months Ending September	
	1921	1922*	1921	1922
Ferromanganese	804	10,718	6,605	72,011
Ferrosilicon	633	3,615	3,883	12,774
Pig iron	2,499	46,839	20,527	109,171
Scrap	5,549	12,224	28,946	60,087
Steel bars	252	657	1,955	5,798
Bar iron	190	371	1,375	4,280
Structural steel	6	289	550	1,784
Billets, without alloys	2	248	3,021	8,554
All other billets	10	375	1,138	1,705
Steel rails	2,850	705	17,622	21,866
Sheets and plates	15	42	1,891	425
Tin and terne plates	5	75	313	2,230
Wire rods	10	235	562	1,302
Total	12,825	76,393	88,388	301,987
Manganese ore and oxide ..	10,402	46,869	366,744	327,537

*To Sept. 21 only.

Imports of Iron Ore by Countries in Gross Tons

	September, 1922		Nine Months Ending September, 1922	
	September, 1922	September, 1922	September, 1922	September, 1922
Spain	11,739		39,936	
Sweden	33,856		219,808	
Canada	346		1,754	
Cuba	22,000		210,520	
Other countries	59,897		190,400	
Total	127,838		662,418	

*To Sept. 21 only.

Sources of Imports of Ferromanganese and Pig Iron in September, 1922, up to and Including Sept. 21, and Principal Sources for Nine Months to Sept. 21:

	Pig Iron		Nine Months, Gross Tons
	September, 1922 Gross Tons	Value	
Belgium	12,448	\$225,550	32,037
France	2,100	41,755	4,369
Sweden	29	989	308
England	11,471	291,222	29,185
Scotland	19,600	385,790	29,617
Canada	1,191	33,044	3,195
Germany			1,516
Total	46,839	\$979,350	

	Ferromanganese		Nine Months, Gross Tons
	September, 1922 Gross Tons	Value	
Germany	300	\$17,958	575
Norway	25	1,483	25
Sweden	2	1,019	254
England	10,301	578,047	70,477
Canada	90	6,096	90
Total	10,718	\$604,603	

iron and 72,011 tons consisted of ferromanganese. The greatest import movement of pig iron in September was from Scotland, the shipments from that country being 19,600 tons. With Belgium and England ranking second and third, respectively, pig iron tonnages from these countries, in the order named, were 12,448 and 11,471 tons. Imports of ferromanganese from England in September amounted to 10,301 tons out of the total movement of 10,718 tons.

The imports of iron and steel in September were the

To Make Test Runs on Synthetic Pig Iron

The Hartford Electric Light Co. has arranged to operate the plant of the Connecticut Electric Steel Co., Inc., Hartford, for a test run on synthetic pig iron. This process consists in converting steel scrap into gray iron by increasing the carbon content and at the same time refining the iron by the elimination of impurities, so that a very high quality of pig iron is produced. The Connecticut Electric Steel Co. produced all of the pig iron used in its foundry in this manner during the war.

The object of this test is to determine the commercial possibilities of the process under local conditions. On account of the high freight rate which must be paid by purchasers of pig iron and also the large quantities of suitable steel scrap available in Hartford and vicinity, it is thought that it will be possible to produce pig iron of analysis superior to the blast furnace product at a price to compete with the delivered cost of blast furnace pig.

Arrangements have been made with several local foundries to send molds to the steel plant into which the molten refined iron will be poured direct, without first casting into pigs and remelting. This will enable these foundries to determine the value of the electric furnace process as a means of producing special high quality iron for particular purposes.

During this test run practically all grades of pig iron will be made, for with the electric furnace process it is possible to vary the percentage of carbon, silicon, manganese, phosphorus and sulphur almost at will and to produce pig iron of the usual foundry grades.

In connection with this test the Hartford Electric Light Co. is anxious to co-operate with any foundries that have any problems requiring a special analysis of pig iron.

A special crane, built by the Industrial Works, Bay City, Mich., for the Virginia Railway, is probably the largest machine of its type in the world. It is known as a type Z and its capacity with outriggers extended is 400,000 lb. at a radius of 17½ ft. Without the use of jack beams, the main hoist will lift 85,000 lb., while the auxiliary hoist will lift 60,000 lb. at a radius of 24 ft.

Robert C. Sweatt, Ltd., Vancouver, B. C., is in the market for one set of Traylor crushing rolls, or equivalent, 36 x 16 in., feed 1½ in. to crush to ¾ in. maximum.

Forty-Three Years' Experience as a Buyer of Iron and Steel



A. W. GLESSNER

A. W. GLESSNER, Chicago, tells of changes in methods which have come in recent years, numerous changes in character of products.

OVER 43 years a buyer of iron and steel, Arthur W. Glessner, Chicago, has an experience paralleled by few men in American business. His first purchase dates back to May 12, 1879, when he was in the employ of N. Hawkins & Co., Chicago, manufacturer of elevator buckets used for handling grain, sand and other materials. Since that time, many changes have taken place in the iron and steel industry, and the names of numerous producers and sellers, familiar in past decades, are now mere memories; yet, singularly enough, the company with which Mr. Glessner placed his first order was Joseph T. Ryerson & Son.

At the time of his initiation into the purchasing profession, Mr. Glessner was a stripling of 18, fresh from Elizabeth, a hamlet near Galena, Ill., where he was born on April 30, 1861. To-day after 43 years, he is the largest buyer of light sheets in Chicago and the West and at the same time is one of the leading manufacturers of hot air furnaces and stove and furnace sheet metal supplies in the United States. His connection with the Hawkins company lasted only a year and a half, after which he became a member of the partnership of Thornburgh & Glessner, its successor. In 1886, he participated in the organization of the Excelsior Steel Furnace Co., of which he became secretary. Four years later, in 1890, he bought out his associates and ever since that time has been president.

When asked what change in the iron and steel industry he regarded as the most important from the point of view of a purchasing agent, he replied:

"Without a doubt the most revolutionary change was in the terms of sale. For years the buyer was given almost unlimited time in which to liquidate his accounts. When the United States Steel Corporation was formed, however, it inaugurated a policy of selling at 30 days net with two per cent off for cash in 10 days, and as a result of this step the iron and steel business is to-day on a cash basis. Another important development, almost co-incidental with the change in terms of sale, was the placing of mill business on a strict carload basis. It was formerly the common practice of mills to solicit small orders, pool them into a carload shipment, and consign the car to one of the group of

buyers, who after unloading his portion of the lading, would permit the remainder to be distributed among the other customers. This practice, though strongly entrenched, was abandoned, with the consequence that the acceptance of less than carload business for mill shipment is now the exception."

In discussing the numerous changes which have taken place in the character of the products rolled by the mills, Mr. Glessner pointed out that his purchases of iron antedated those of steel. His first order called for galvanized iron sheets. Iron sheets have been long since largely supplanted by steel sheets; yet such terms as "sheet iron" and "galvanized iron," harking back to the old days, are still used by the sheet metal trade in referring to present-day steel products. Because of his large consumption of sheets, Mr. Glessner has been a close student of the quality of mill products and has the distinction of introducing into this country the production of a special grade of sheets previously made only in Europe. For years he had noted that there was a loss of from five to ten per cent in wasters in making stove and furnace pipe elbows out of black sheets. He was therefore much interested when, upon a visit to Germany some 16 years ago, he was shown a one-pass sheet of such ductility that it insured the elimination of this loss. Upon his return to the United States, he induced a leading steel manufacturer to make a similar grade of sheets and to this day it is known as "Glessner special" in recognition of what he did to introduce it in this country. This sheet has an even blue color in contrast with the almost iridescent appearance of the ordinary black sheet. Practically all American sheet mills now roll such sheets under various trade names.

Mr. Glessner has the habits of mind of a purchasing agent and when asked his views regarding the reported impending mergers of independent steel makers, he replied:

"As a buyer, I naturally prefer many competing mills, as it gives one a wider market in which to trade. Drawing upon my experience as a manufacturer, however, I can see that the consolidations will result in economies in production which cannot fail to accrue to the benefit of users."

Car Service at Youngstown Shows Improvement

YOUNGSTOWN, Nov. 7.—Aside from curtailment this week at the Niles sheet plant of the Republic Iron & Steel Co., schedules of Mahoning Valley iron and steel properties are moving forward with little change. The Republic company was compelled to reduce the number of active sheet mills at Niles from 16 to 8, because of congestion produced by heavy accumulation. This reduction in production will enable the railroads to clear away part of the accumulated output, after which the plant will again resume on a normal basis.

A branch line is now being built to connect this plant with the Baltimore & Ohio Railroad, and it will then have rail service from two trunk line carriers.

In other respects, car supply for Valley industries has materially improved the past month. The Youngstown Sheet & Tube Co. has virtually no accumulation,

and President James A. Campbell states that while transportation is not yet normal, it shows material betterment. Motive equipment is still inadequate. Large numbers of new cars are being built and many are being repaired, so that the car supply is being improved in this respect. Many new cars will be delivered to the railroads and to private owners between now and the end of the year, states Mr. Campbell.

Judge Elbert H. Gary was awarded the Louis Livingston Seaman Medal by the Safety Institute of America at a luncheon given by Arthur Williams, president of the institute, at the Bankers' Club in New York, on Nov. 2, in Judge Gary's honor. The medal was awarded in recognition of conspicuous achievement in the conservation of human life in his capacity as leader of the recent New York safety week campaign.

Judge Gary Defends Pittsburgh Basing Plan

Tells Examiner of Federal Trade Commission That Chaos
Would Result if There Were No System of Figuring
Prices—Hearing Continued at Washington

BY L. W. MOFFETT

WASHINGTON, Nov. 6—With the utmost frankness, Chairman Elbert H. Gary appeared here to-day and testified in connection with the Pittsburgh base hearing before Examiner J. W. Bennett, the commission's attorneys being K. E. Steinhauer and G. S. Burr. Representing counsel for the Steel Corporation are C. A. Severance and W. W. Corlett. Accompanying Judge Gary were controller W. J. Filbert and F. R. Sites, secretary to Mr. Gary.

The direct examination of Judge Gary was conducted by Mr. Steinhauer. The line of his questions indicated that he is seeking to show that the Steel Corporation dominates the steel market and makes its prices and uses the Pittsburgh base as a device to this end. The testimony of Judge Gary was clear and was pointed, holding that the suggestion of its powers is without justification. In substance, the contention of Judge Gary was that the Pittsburgh base can operate only when there is an equality as between supply and demand or the latter is greater than the former, and that when business is poor it is merely theoretical.

Attorney Steinhauer asked Judge Gary the reason the Federal Trade Commission had difficulty in getting certain information from the steel trade.

Sharp Competition

"You must remember the members of the iron and steel industry have very sharp competition all the time and they do not furnish to each other the details of the business required, as they might affect competition," replied Judge Gary. "You have no trouble I think or the governmental departments have no trouble to get figures which express the total of any feature of business. But they might have difficulty in getting figures which might be of benefit to one competitor to the prejudice of another competitor. The Federal Trade Commission, I think as a rule, has been able to secure without hindrance and with a good deal of aid the figures which are pertinent and which are withheld from general circulation among the iron and steel people. Of course I do not know exactly what you refer to now and perhaps it would not make any difference if I did know. I think the Federal Trade Commission as a rule has commended the Steel Corporation particularly because of the information which it has furnished from time to time. I know during the war members of the Federal Trade Commission, members of the War Industries Board and other Government departments expressed satisfaction at what we had done in furnishing figures for Government purposes."

Information Delayed

Mr. Steinhauer then said the commission has been unable to get certain information from the Carnegie Steel Co., and wanted to know why submission of the information had been delayed.

"Well, I would criticize any man, or any officer, or any corporation for unreasonably delaying to give consideration to a small request," replied Judge Gary. "I can't answer your question, as I do not know just what was involved, but it is a fact that the Steel Corporation reserves the right to pass on these questions of policy. Sometimes the subsidiary company may not know how far reaching the inquiry may be and it may be our fault. I remember only a very short time ago a question reached me for final decision concerning the furnishing of data and the decision was not in favor of furnishing it. So there has been some doubt. Now when the company furnishes for general distribution

information as to how much of any product is furnished in a particular State or location it is giving a competitor a knowledge of decided advantage to him. I do not believe there is any complaint that the Steel Corporation is not pretty liberal in giving access to its works, to Americans and foreigners alike. In fact, I think we are very reasonable in that respect, but there are times that we may have been slow or doubtful. I presume this might be admitted. Anyhow, we try to carry on our business in a business-like way."

Speaking of the alleged ability of the Carnegie Steel Co., before organization of the Steel Corporation, to compete in the Chicago district because of the use of the Pittsburgh base, Mr. Steinhauer asked how it could do it.

"Any company could go into any district and sell what surplus it had provided it could meet the market," the witness answered. "There is always the question of supply and demand and the cost of producing and delivering."

Competition in Early Days

Expanding this thought Judge Gary continued: "In those early days the Carnegie Steel Co. had a decided advantage from the other days and it would sell often at whatever price it could get in competition with another company, with a view to driving the other company out of business. It was a method of the old regime. It is impossible to say what a large or very prosperous company will not do to keep its mills filled."

He said that steel companies sometimes did and sometimes they did not charge the Pittsburgh base in the old days, as always has been and is now the case.

"This Pittsburgh basis existed for the purpose of establishing a quotation price, fixing a quotation price," Judge Gary explained. "It was adhered to or not, depending upon whether the law of supply and demand justified it and that depended upon whether business was good or poor, upon whether there was enough steel manufactured in the western district to supply the trade. Trading in steel is like the trading in anything else. The seller of steel and the buyer of steel have to make bids and contracts depending upon what the general market is and they both like some place for fixing the price. Otherwise there would be chaos. Take for instance the price of wheat, quoted on a Chicago basis."

Some Misunderstanding

Judge Gary said he thought that there has been some misunderstanding as to what the Pittsburgh base means in practice. He referred to producing capacity and said it changes in various places. The cost of production has changed in a great many places, it was pointed out, and a great many circumstances have changed. All the time, it was said, the question settles down to what price the seller is willing to sell at if he has anything to sell, and what the buyer is willing to buy at if he wants to buy.

"That is a general statement, but nevertheless it is a fundamental statement as I understand it," was added.

"Generally have you quoted prices on the Pittsburgh basis?" asked Mr. Steinhauer.

"I would say generally as I understand it we have quoted prices on a Pittsburgh base and perhaps more than the average steel company we have sold on a Pittsburgh base," was the reply, "but when business is dull the Steel Corporation has absorbed part of the freight, to a greater or less extent, to secure business, and I believe that at least many of the competitors have absorbed a greater part."

Judge Gary was asked if any discrimination was

made in price by the Steel Corporation as between consumers of its products.

"I would say that between customers there is not any discrimination except depending upon quantities," he replied. "But I believe in the practice that in all these lines the Steel Corporation to a substantial extent reduces its prices, or at least absorbs part of the freight in order to get the business after it has found that it was necessary. Now I must admit, however, in making that statement that I am not sufficiently familiar with that business in detail, to be positive just what the practice is. I know what our general practice is. I know there are times when a very large contract has been offered and some reductions of prices have been made. I think that has been justifiable."

Maintaining Pittsburgh Base

Mr. Steinhauer wanted to know the ability of the steel trade to maintain the Pittsburgh base plan.

In times of stress, Judge Gary said, the law of supply and demand will not permit the use of the Pittsburgh base, except as a basis for quotations for the buyer and for the seller to go by. He expressed the opinion that the Pittsburgh base prior to 1895 came more from speech in the trade rather than any actual practice. He pointed out that it is the effort of the Steel Corporation to stabilize prices as far as it can so that they shall be neither too high nor too low. He said he knew that there were times when they were too high and the Steel Corporation sold below its competitors. As business became dull, he said, speaking of a period after the war, competitors sold below the cost of production, and speaking of 1921 he said the Steel Corporation was forced to reduce prices to the low point to meet competition and to reduce wages. He also recited the fact that Steel Corporation prices were held down through 1919 and 1920 below those of competitors. Mr. Steinhauer wanted to know if in that instance and in 1921 the independents or the Steel Corporation were following the law of supply and demand. Judge Gary said the independents followed it, but could not reach it. He concluded that there were times when the seller took advantage of location of its plant, but when compared with what the purchaser does when the demand exceeds the supply, it is nothing to speak of."

Not Guilty of Wrong Doing

"I deny," said Judge Gary, emphatically, "that our corporation uses the Pittsburgh base or any other rule of trade unconscionably and with a view to seeking advantage over our customers which is not fair and right. I do not think that, if that had been our policy, we would have been allowed by the Supreme Court to live and we ought not to have."

Mr. Steinhauer, advertising once more to the law of supply and demand, attempted to show that the Carnegie Steel Co. in 1921 was able to sell steel in the Chicago district at \$7.60 more, based on the freight rate of 38c. per lb. on plates, shapes and bars over the Pittsburgh price, despite the fact that the industry was depressed and Gary plants operating at low capacity.

Judge Gary said there were a number of things that might enter into such a situation and while he denied knowledge of the matter, said such things as maintenance of heavier operations of the Carnegie Steel Co. would mean a lower cost, that the law of supply and demand is subject to temporary interruptions and its operations delayed until the real market is found. Then he gave the following definition of this law:

"The law of supply and demand includes the ability of and willingness of one to sell at a certain price and the ability and willingness of another to buy at that price. Of course, if a producer has a larger quantity than he can sell, the supply is large and his willingness to sell increased. If the proposed purchaser is anxious to buy and use a very large quantity for immediate de-

livery, of course he is willing to buy at a greater price. It is a meeting of minds. If for any reason one is compelled to act and is not left free, then to a corresponding extent the law of supply is temporarily suspended or modified."

Duluth and Chicago Plants

Judge Gary said that the steel industry would not have established plants at Duluth, Minn., Chicago and other places had it not been for the Pittsburgh base. He pointed out that the producers knew that they could get the Pittsburgh price plus the freight differential for their product in normal times when the demand is as great as the supply. He stated, therefore, that if it had not been for the Pittsburgh base, consumers would have had to pay the Pittsburgh plus price anyhow. Moreover, he stated that on the average the district consumers in Chicago pay no more on the whole than those in Pittsburgh. Stressing the point that the Steel Corporation bends its energies toward the stabilization of the steel industry when it can, Judge Gary said that conditions in that industry have improved since the incorporation of the Steel Corporation because it has had a stabilizing influence.

Previously Judge Gary, in reply to a question by Mr. Steinhauer, said that 85 to 90 per cent of the cost of production in the steel industry from the raw to the finished products is in labor. He declared that wages cannot be reduced, owing to the high cost of living. The value of property of the Steel Corporation was placed at \$2,250,000,000. He stated that it is not making any great profits but that conditions are improving and adjusting themselves. He expressed the belief that the Pittsburgh base is an element of stability for all concerned, including both the producers and the consumers.

Mr. Steinhauer tried to get the witness to state the relation between the cost of production at the Gary and the Pittsburgh mills. Judge Gary said that this depended upon a number of conditions which are changeable. The Gary mills, he said, were new about 10 years ago and he believed at the time costs were reasonable and fair and in some lines lower than in Pittsburgh. All things being equal, however, he said that he believed Pittsburgh could at least take care of itself to-day and possibly produce at a lower cost than Gary. This answer was surrounded by a number of conditions such as markets, equipments, capacity of operations, etc.

Judge Gary was excused at 3.30 o'clock so that he could return to his home and will be recalled for further direct examination on Wednesday, Nov. 15. It is understood that testimony will be given to-morrow by John A. Penton, president Penton Publishing Co., Cleveland, publisher of the *Iron Trade Review*. Among other witnesses called for this week is William G. Gray of the American Iron and Steel Institute, who is scheduled to appear Friday. It is the purpose of the Commission to conclude the taking of direct testimony some day next week, after which the Steel Corporation will present its side of the proceedings.

Mr. Findley's Testimony

A. I. Findley, editor of THE IRON AGE, the first witness called at the present proceeding, testified on Wednesday, Nov. 1. He was questioned by Attorney Steinhauer on behalf of the Federal Trade Commission as to the reliability of quotations carried in THE IRON AGE. Mr. Findley pointed out that iron and steel contracts are based on quotations carried in THE IRON AGE and Attorney Severance made the observation that THE IRON AGE is highly regarded in the trade. The manner of gathering market and other news, its accuracy and the method of arriving at the quotations given in THE IRON AGE were explained by Mr. Findley, it being made clear that market information is gathered and prepared by a staff specially trained in the work, and that the sources of such information are both buyers and sellers. Attorney Steinhauer submitted in evidence statements from prominent steel men as to the standing of THE IRON AGE in the trade and its acceptance as an authority. The attorney for the commission also put into the record an elaborate compilation of articles from THE

IRON AGE since 1873, when the Pittsburgh Base was said to have been established. The material consisted of various news articles as well as editorial comment. Apparently it was incorporated in the record to show price trends, trade practices and market developments.

Conditions in Sheet and Tin Plate Trade

On the following day, Thursday, the witness was J. I. Andrews, general manager of sales, American Sheet & Tin Plate Co., Pittsburgh. The evidence brought out by the questions of Mr. Steinhauer dealt almost exclusively with matters that now are well known trade history. The commission had asked for correspondence and other official records of the American Sheet & Tin Plate Co. and without raising any issue as to the authority of the commission to obtain this material, it was freely offered by Mr. Andrews. His evidence consisted of description of conditions in the sheet and tin plate industry, particularly during and since the war. Mr. Steinhauer asked and was told regarding prices, production, contracts, etc., some of the information being based on the records in the files of the company. Where he was called upon to do so, Mr. Andrews elaborated on subjects that were brought up. When asked about the differences in the prices of the American Sheet & Tin Plate Co., and those of independent producers during 1919 and 1920, Mr. Andrews pointed out that the American Sheet & Tin Plate Co. adhered to the schedule of prices adopted in March, 1919, which had been prepared by a committee of the American Iron and Steel Institute, with the idea of continuing fixed prices that had been instituted during the war upon the initiative of the Government. The Government, however, not desiring to continue the policy of price fixing, the trade itself adopted the schedule referred to. But as demand increased and the market became strong, independent producers' prices were advanced, while the Steel Corporation subsidiaries continued maintaining the schedule of prices that had been drawn up by the Iron and Steel Institute committee. Mr. Andrews referred to 1921 as being probably the most acutely competitive year in the history of the sheet and tin plate industries. Asked to explain certain correspondence between his office and salesmen of his company regarding prices, Mr. Andrews said that never in 25 years had he heard so much misinformation as during the first nine months of 1921.

The Irregular Market of 1921

"I insisted," said Mr. Andrews, "that our own people should present facts only and that they should run down these reports whenever possible. I was trying to stabilize our own salesmen more than anything else." He said that he knew that competitors were selling below the American Sheet & Tin Plate Co. and judged they were underselling it during a part of the year mentioned by a maximum of \$5 per ton, this being particularly true, it was pointed out, from April to November. Prices, Mr. Andrews said, were on a Pittsburgh basis. Mr. Steinhauer asked Mr. Andrews how the Pittsburgh district railroad rates had been fixed. Mr. Andrews replied that he did not think they had been "fixed" in any way, except by the railroads themselves. Inquiry was made of Mr. Andrews as to the relative production of sheets in Ohio and Pennsylvania. Mr. Andrews replied that without looking up the records he could not say positively which State produced the greater tonnage. "Why, then," inquired Mr. Steinhauer, "should there be a Pittsburgh basing point on sheets and not such a basing in Ohio?"

"I will answer that question by asking another," replied Mr. Andrews. "If there should be an Ohio basing point, where in Ohio would it be?"

Attorney Steinhauer asked Mr. Andrews about proposed changes of the American Sheet & Tin Plate Co. relating to differentials and extras. Mr. Andrews replied that they applied largely to pickled sheets and finishes that cost more now than they did when the present differentials and extras were established. He said he was sure that some of the changes made by the American Sheet & Tin Plate Co. would not be the same as those of its competitors. Activities of the

National Association of Sheet and Tin Plate Manufacturers were taken up by Mr. Steinhauer, and Mr. Andrews pointed out that the American Sheet & Tin Plate Co. is not a member of the association, but is familiar with its statistical studies and other undertakings, such as those relating to the improvement of practice of manufacture.

Sheet Bars from Gary to Pittsburgh

Speaking of the exceptional activity of the steel industry in 1920, Mr. Andrews said that for the first and only time in history the American Sheet & Tin Plate Co. was unable to get sheet bars from its sister company, the Carnegie Steel Co., in the Pittsburgh district, and had to obtain them from the Gary, Ind., plant of the Illinois Steel Co. He said that the American Sheet & Tin Plate Co. had to bear the excess freight on the sheet bars; that is, the difference between the freight paid on shipments from the Carnegie plant in the Pittsburgh district and the freight paid on shipments from Gary. He said that on an average the excess was \$4 per ton. Adverting to present-day conditions, Mr. Andrews said that the Elwood, Ind., plant of the American Sheet & Tin Plate Co. is obtaining sheet bars from the Duluth, Minn., plant of the Steel Corporation. This extraordinary movement of semi-finished material is due, he pointed out, to the shortage of coal at the Gary plant from which sheet bars for Elwood ordinarily are obtained. The freight rate from Duluth is \$6.03 per gross ton, while from Gary it is \$2.53. Mr. Andrews was cross-examined by Attorney Corlett, who had the witness develop more fully some of the points brought out by Mr. Steinhauer.

The Sheet and Tin Plate Association

Testimony was given Friday by Charles O. Hadly, general manager of sales, Alan Wood Iron & Steel Co., Philadelphia, and President W. S. Horner of the National Association of Sheet and Tin Plate Manufacturers. Their evidence related largely to the activities of the association. Official association records were presented by Mr. Horner at the request of the commission. Mr. Hadly, whose company is a member of the association, submitted records from the company files. The testimony, like that of Mr. Andrews, was almost entirely devoted to conditions in the trade, which are well known and which were currently published. Attorney Corlett objected to certain portions of the testimony as being irrelevant, but these were admitted by the examiner with the understanding that the attorney for the commission should connect the evidence with the issue involved in the case. Correspondence of the Alan Wood Iron & Steel Co., sent and received, was read, and its significance inquired into by the commission attorney. Attorney Severance asked Mr. Hadly if there was any collusion as to prices of sheets among members of the association. Mr. Hadly replied that there was none.

Mr. Horner said that his association operated as a clearing house for the exchange of trade information. Its membership is composed of manufacturers who represent from 60 to 65 per cent of the sheet steel production. It was stated that the American Sheet & Tin Plate Co., which is not a member of the association, produces about 30 per cent of the sheet output.

Chicago Building Increases

Permits were issued in Chicago in October for 1103 buildings fronting 34,794 ft. and costing \$14,996,150, as compared with 924 permits fronting 28,067 ft. and costing \$12,263,100, issued in September. The October record also exceeded that of October, 1921, when 876 permits were issued covering 26,481 ft. of frontage and involving a cost of \$10,457,250.

The Double Drive Truck Co., formerly located in Chicago, has moved to Benton Harbor, Mich., having purchased the Mandel plant. Machinery and tools are being installed and production is expected to be under way in a few weeks. This company manufactures the 1½ and 3-ton Pulmor trucks.

WOULD CHECK DECLINE

Sellers in Youngstown District Firmer in Making Quotations

YOUNGSTOWN, Nov. 7.—Efforts of major Valley industrial interests to stem the downward tide of steel prices are being noted. Feeling prevails among district interests that there is a heavy unsatisfied demand for their products which is being held in abeyance through expectation of lower prices. Coal prices, too, are showing higher tendencies, and quotations to industrial buyers are up 25c to 50c per ton for coking grades. Steel makers attribute this condition partly to car shortage and to heavy industrial demand. Coal storage has been on a much smaller scale this year than previously and most interests will enter the winter with very little coal accumulation.

In this territory, there is no evidence as yet of concessions under \$40 for sheet bars, billets or slabs. Makers, in fact, are well sold ahead in sheet bars for delivery over rest of the quarter. There is a disposition, however, to believe that the price will recede for the first quarter of 1923, and will possibly settle to a \$37.50 basis.

Sheet Demand Spotty

Sheet demand is characterized by several of the leading makers as somewhat spotty. Prices for black grades have definitely settled to the 3.35c quotation of the American Sheet & Tin Plate Co., and no Valley mill would likely refuse business at this figure. Galvanized grades, likewise, are definitely weaker, and while 4.50c is still applying on some tonnages, business has been accepted at 4.35c.

The smaller makers, who were among the first to cut under the 3.50c price on black sheets, have apparently forced the larger interests to mark down their quotations in order to protect themselves. As a result, the galvanized price, which remained firm at 4.50c for a time even after black sheets had declined to 3.35c has been definitely weakened.

Furthermore, there have been gaps in rolling schedules of Valley interests which they were anxious to fill. Most of the sheet tonnage accumulation in this territory has been moved, but one interest which has 7500 tons piled, has reduced production temporarily to permit the railroads to make some inroads into this piled output.

It is the belief in influential independent quarters in this district that sheet prices will enter the first quarter of next year at the current level of the leading interest.

The Tin Plate Price

The principal Valley maker of tin plate is just now considering the price to be named on next quarter tonnage, and there is a strong undercurrent that the quotation will be moved up to \$5 per base box. What the independents will do in this respect, though, depends in large measure upon the attitude of American Sheet & Tin Plate Co. From now until the close of the year, it is expected that the more important tin plate consumers will sign contracts covering their requirements for the first six months of 1923. They are already freely inquiring about prices.

The independents are now receiving a considerable volume of business for this season of the year, owing to the fact that they are in better position than the leading interest to meet delivery requirements. Prices on tonnages now going through the rolls range from \$4.60 to \$4.75, the larger buyers as usual receiving preferential treatment. A Valley independent declares that the margin of profit on tin plate at the current range has been inadequate, and an advance is justified on this account, predicting it will be sustained by demand. In fact, this maker contends that prices would have been marked up sooner had it not been for the action of a Pittsburgh independent in accepting a large volume of business at \$4.60. He points out that a reduction of \$2.50 per ton in sheet bars would mean only 10c per box on tin plate, and that this amount would be more than offset by higher labor charges.

In the strip market, automotive demands continue to lead, with the Ford Motor Co. the heaviest buyer. Fabricators, pressed and stamped metal interests are likewise substantial purchasers of strip. The leading Valley producer is quoting hot-rolled at 2.95c to 3.15c, the lighter gages commanding the higher prices. Cold-rolled finishes are firm at a 3.50c. base. One Valley interest is establishing new production records in its strip department. Strip steel is replacing castings for many operations and sheets to some extent.

Plate makers here state that the Bethlehem Steel Co., which recently cut its plate price to 2c, has advanced it \$2 per ton, to 2.10c, Pittsburgh. Early deliveries on merchant steel bars likewise command better than 2c, though large tonnages were booked at the lower figure.

Basic pig iron is now quotable in the Valleys at \$29 to \$30, with foundry at \$31 for No. 2 grade. Prices in the iron market are definitely weaker due to larger production and reduced coke prices. Furnace coke is now obtainable at \$7.50, and Valley buyers look for further concessions.

Lake Superior Iron Ore Shipments in October

Shipments of iron ore from Lake Superior in October were 6,081,386 gross tons as compared with 3,233,081 tons in October, 1921. This is an increase of 2,848,305 tons or 88.10 per cent. The season's shipments to Nov. 1, this year, have been 39,192,624 tons as against 21,894,275 tons to Nov. 1, 1921, an increase of 17,298,349 tons or 79.01 per cent. The following table gives the October and season shipments by ports and the corresponding figures for 1921, in gross tons:

	October		To Nov. 1	
	1921	1922	1921	1922
Escanaba	405,554	795,801	1,719,885	4,121,426
Marquette	259,491	231,661	719,293	1,857,564
Ashland	335,180	800,494	2,183,108	5,442,839
Superior	655,915	1,793,270	4,833,413	10,277,983
Duluth	1,188,926	1,730,870	9,164,803	11,914,348
Two Harbors	388,015	729,290	3,273,773	5,678,464
Total	3,233,081	6,081,386	21,894,275	39,192,624
Increase		2,848,305		17,298,349

The Duluth proportion this year to Nov. 1 of 30.40 per cent was considerably less than a year ago when it was 41.86 per cent of the total. The Great Northern dock at Superior is credited with 23.37 per cent of the total shipments this year against 20.12 per cent last year.

Elements of Industrial Heating

In a 44-page booklet 8½ x 11 in. the W. S. Rockwell Co., 50 Church Street, New York, has made a notable compilation of the factors entering into industrial heating. The factors cover the quality and cost of products subjected to the action of heat in the process of manufacture and the selection and use of equipment and fuels necessary to produce better results at a lower cost. Among the illustrations are scores of furnace sections for work of all kinds, including heating, annealing, heat treating, automatic conveyor furnaces, muffle and pot furnaces, melting and regenerative furnaces, etc. Curves are given comparing various fuels as to efficiency and cost and diagrams show the character and distribution of losses from various types of equipment.

Oglebay, Norton & Co., Cleveland, are erecting about 75 dwelling houses at Ramsey, Mich., for use of employees at its Eureka mine. This firm is also planning a large housing program at Hurley, Wis., where it operates the Montreal mine. A new shaft is being built at this mine and when completed additional houses will be needed for the miners. According to present plans, about 75 houses will be erected at this mine during the coming year.

The Tod foundry at Youngstown of the United Engineering & Foundry Co., Pittsburgh, has resumed after being idle since May, 1918.

OCTOBER IRON OUTPUT

Gain Last Month 17,301 Tons Per Day as Compared with September

Thirty-two Furnaces Blown In and Only Three Blown Out or Banked

The pronounced improvement in the fuel situation has been reflected in a very sharp upturn in the country's pig iron output for October. It is necessary to go back to December, 1920, to find a month which exceeds the record made in October for the blast furnaces of the country. Not only was the total production of pig iron last month the largest since December, 1920, but the number of furnaces active on Nov. 1 was the greatest since Dec. 1, 1920. There were 32 furnaces blown in during October and only three blown out, or a net gain of 29. The increase also in daily output of 17,301 tons over September was more than 25 per cent.

Production of coke and anthracite pig iron for the 31 days in October amounted to 2,637,844 gross tons, or 85,092 tons per day as compared with 2,033,720 tons, or 67,791 tons in September, a 30-day month. This represents a gain of 604,124 tons over October.

The total number of furnaces in blast on Nov. 1 was 218 as compared with 189 on Oct. 1, with 144 on Sept. 1, with 172 on Aug. 1 and with only 29 on Aug. 1, 1921, the low point in the depression last year. It is the first time this year that over 200 furnaces were in blast the first of the month. On Dec. 1, 1920, the number of furnaces in blast was 252. The capacity of the 218 furnaces in blast on Nov. 1 is estimated at 87,935 tons per day, as compared with 77,005 tons per day for the 189 furnaces in blast on Oct. 1.

The manganese-iron alloy output for October was 21,478 tons, of which only 9193 tons was ferromanganese.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from October, 1921, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons	Steel Works		Merchant		Total
	October, 1921	November	December	January, 1922	
October, 1921	33,365	6,850	40,215		
November	37,960	9,223	47,183		
December	41,173	12,023	53,196		
January, 1922	42,130	10,933	53,063		
February	46,827	11,387	58,214		
March	53,547	12,128	65,675		
April	56,930	12,140	69,070		
May	60,619	13,790	74,409		
June	62,534	16,167	78,701		
July	62,295	15,297	77,592		
August	45,672	12,914	58,586		
September	53,856	13,935	67,791		
October	66,060	19,032	85,092		

The figures for daily average production, beginning with January, 1916, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1916—Gross Tons	1916				1922			
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Jan.	102,746	101,643	77,799	106,525	97,264	77,945	53,063	
Feb.	106,456	94,473	82,835	105,006	102,720	69,187	58,214	
Mar.	107,667	104,882	103,648	99,685	108,900	51,468	65,675	
Apr.	107,592	111,165	109,607	82,607	91,327	39,768	69,070	
May	108,422	110,238	111,175	68,002	96,312	39,394	74,409	
June	107,053	109,002	110,793	70,495	101,451	35,494	78,701	
July	104,017	107,820	110,354	78,340	98,931	27,889	77,592	
Aug.	103,346	104,772	109,341	88,496	101,529	30,780	58,586	
Sept.	106,745	104,465	113,942	82,932	104,310	32,850	67,791	
Oct.	113,189	106,550	112,482	60,115	106,212	40,215	85,092	
Nov.	110,394	106,859	111,802	79,745	97,830	47,183		
Dec.	102,537	92,997	110,762	84,944	87,222	53,196		

Production of Steel Companies—Gross Tons

Returns from all furnaces of the United States Steel Corporation and the various independent steel

Production of Steel Companies—Gross Tons	Total Production			Spiegeleisen and Ferromanganese		
	1920	1921	1922	1920	1921	1922
Jan.	2,232,455	1,932,159	1,306,045	23,957	22,228	6,874
Feb.	2,181,679	1,625,695	1,311,170	28,088	29,013	8,540
Mar.	2,480,668	1,393,443	1,629,982	35,275	41,294	13,695
Apr.	1,968,542	1,015,621	1,707,902	27,628	24,310	19,209
May	2,128,720	1,024,678	1,879,180	33,407	9,232	20,334
June	2,209,770	883,312	1,876,033	34,751	4,536	23,090
July	2,230,567	715,664	1,931,138	36,789	5,524	26,049
Aug.	2,024,943	807,144	1,415,839	36,985	3,878	19,327
Sept.	2,247,250	815,692	1,615,696	39,546	3,289	14,916
Oct.	2,393,644	1,034,312	2,047,873	34,786	3,902	21,478
Nov.	2,150,075	1,138,789		26,944	3,525	
Dec.	2,047,167	1,276,381		28,023	3,953	

companies, as well as from merchant furnaces producing ferromanganese and spiegeleisen, show the following totals of steel making iron, month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces for October and the three months preceding:

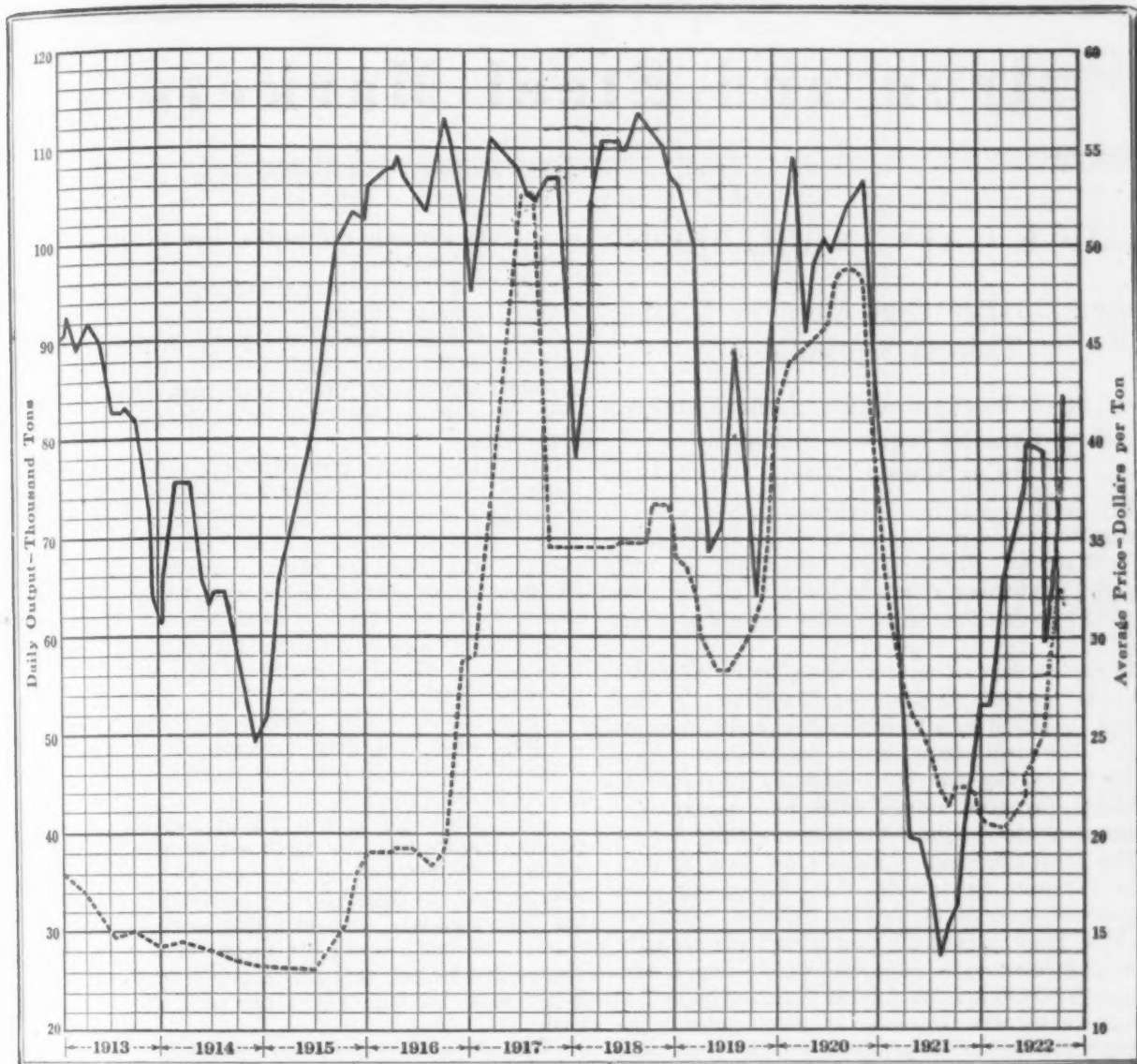
Pig Iron Production by Districts, Gross Tons	Oct.	Sept.	August	July
	(31 days)	(30 days)	(31 days)	(31 days)
New York	148,419	115,635	80,322	145,831
New Jersey	13,134	10,736	11,604	10,475
Lehigh Valley	63,635	55,711	46,254	58,068
Schuylkill Valley	66,232	41,646	35,286	51,675
Lower Susquehanna and Lebanon Valleys	32,374	25,440	20,679	26,698
Pittsburgh district	610,281	502,804	432,178	493,963
Shenango Valley	92,728	83,841	58,812	89,335
Western Penna.	116,508	68,140	62,659	81,927
Maryland, Virginia and Kentucky	54,856	44,136	41,324	58,506
Wheeling district	72,770	43,366	57,752	65,753
Mahoning Valley	302,434	218,363	130,555	233,813
Central and Northern Ohio	290,185	184,914	191,880	261,084
Southern Ohio	28,248	17,909	15,305	29,517
Illinois and Indiana	416,073	346,380	342,363	472,371
Mich., Minn., Mo., Wis. and Colo.	98,608	67,656	67,265	101,656
Alabama	210,994	204,802	204,389	195,929
Tennessee	20,365	22,241	17,543	15,764
Total	2,637,844	2,033,720	1,816,170	2,405,365

Capacities in Blast Nov. 1

The following table shows the number of furnaces in blast Nov. 1 in the different districts and their capacity, also the number and daily capacity in gross tons of furnaces in blast Oct. 1:

Coke and Anthracite Furnaces in Blast	Location of Furnaces	Total Stacks	Nov. 1		Oct. 1	
			In Blast	Capacity per Day	In Blast	Capacity per Day
New York:						
Buffalo	22	12	4,800	12	5,300	
Other New York	4	0		0		
New Jersey	4	1	420	1	360	
Pennsylvania:						
Lehigh Valley	18	5	1,900	5	2,000	
Spiegeleisen	2	1	150	1	140	
Schuylkill Valley	15	6	2,130	6	2,400	
Lower Susquehanna	10	3	1,090	2	900	
Lebanon Valley	6	1	130	1	120	
Ferromanganese	2	0				
Pittsburgh District	55	42	19,500	40	20,000	
Ferromanganese and Spiegel	4	2	390	2	275	
Shenango Valley	19	9	3,500	5	2,400	
Western Penna.	26	10	4,050	9	3,600	
Maryland	5	4	1,530	3	1,400	
Ferromanganese	1	1	75	0		
Wheeling District	15	5	2,430	4	1,450	
Ohio:						
Mahoning Valley	28	21	9,830	17	6,800	
Central and Northern	26	22	9,360	16	6,400	
Southern	16	4	930	3	1,300	
Illinois and Indiana	42	28	14,340	24	12,000	
Mich., Wis. and Minn.	12	9	3,085	7	2,450	
Colorado and Missouri	6	1	430	1	350	
The South:						
Virginia	16	1	365	0		
Kentucky	7	1	260	1	250	
Alabama	40	21	6,500	21	6,300	
Ferromanganese	1	1	70	1	70	
Tenn., Ga. and Texas	16	7	670	7	740	
Total	418	218	87,935	189	77,005	

Among the furnaces-blown in during October were the following: C furnace of the Bethlehem Steel Co. in the Lehigh Valley; A furnace of the Bethlehem Steel Co. in the lower Susquehanna Valley; No. 5 Aliquippa furnace of the Jones & Laughlin Steel Co., and one furnace of the Pittsburgh Steel Co. in the Pittsburgh district; No. 4 Shenango furnace and the three Farrell furnaces of the Carnegie Steel Co. in the Shenango Valley; one furnace of the Cambria Steel Co. in western Pennsylvania; the Max Meadows furnace of the Virginia Iron, Coal & Coke Co. in Virginia; B and C furnaces of the Bethlehem Steel Co. in Maryland; the Martin's Ferry furnace of the Wheeling Steel & Iron Co. in the Wheeling district; two furnaces of the Youngstown Sheet & Tube Co., the Anna furnace of the



The Full Line Represents the Daily Production of Pig Iron and the Dotted Line Is the Average of the Price Per Ton of No. 2 Southern Pig Iron at Cincinnati, Local No. 2 Iron at Chicago and No. 2X Iron at Philadelphia

Struthers Furnace Co. and the Cherry Valley furnace in the Mahoning Valley; one Central furnace of the American Steel & Wire Co., two furnaces of the Columbus works of the American Rolling Mill Co., one furnace of the National Tube Co., one River furnace and the Upson furnace in central and northern Ohio; the Jisco furnace of the Jackson Iron & Steel Co. in southern Ohio; one Calumet, one Federal, one Iroquois and one South Chicago furnace in the Chicago district; B furnace of the Ford Motor Co. in Michigan, No. 2 furnace of the Minnesota Steel Co. in Minnesota and two furnaces of the Woodward Iron Co. in Alabama.

Among the furnaces blown out or banked during October were the following: D furnace of the Bethlehem Steel Co. in the Lehigh Valley; No. 3 North Birmingham furnace of the Sloss-Sheffield Steel & Iron Co. and No. 2 Bessemer furnace of the Tennessee Coal, Iron & Railroad Co. in Alabama.

Diagram of Pig Iron Production and Prices

The fluctuations in pig iron production from 1913 to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production by months of coke and anthracite iron. The dotted curve on the chart represents monthly average prices of Southern No. 2

foundry pig iron at Cincinnati, local No. 2 foundry iron at furnaces in Chicago, and No. 2X at Philadelphia. They are based on the weekly quotations of THE IRON AGE.

Production of Coke and Anthracite Pig Iron in the United States by Months, Beginning Jan. 1, 1918—Gross Tons

	1918	1919	1920	1921	1922
Jan. ...	2,411,768	3,302,260	3,015,181	2,416,292	1,644,951
Feb. ...	2,319,299	2,940,168	2,978,879	1,937,257	1,629,991
Mar. ...	3,213,091	3,090,243	3,375,907	1,595,522	2,035,920
Apr. ...	3,288,211	2,478,218	2,739,797	1,193,041	2,072,114
May ...	3,446,412	2,108,056	2,985,682	1,221,221	2,306,679
June ...	3,323,791	2,114,863	3,043,540	1,064,833	2,361,028
½ year...	18,002,572	16,033,808	18,138,986	9,428,166	12,050,683
July ...	3,420,988	2,428,541	3,067,043	864,555	2,405,365
Aug. ...	3,389,585	2,743,388	3,147,402	954,193	1,816,170
Sept. ...	3,418,270	2,487,965	3,129,323	985,529	2,033,720
Oct. ...	3,486,941	1,863,558	3,292,597	1,246,676	2,637,844
10 mos...	31,718,356	25,557,260	30,775,351	13,479,430	20,943,782
Nov. ...	3,354,074	2,392,350	2,934,908	1,415,481	.....
Dec. ...	3,433,617	2,633,268	2,703,855	1,649,086	.....
Ttl. yr.*	38,506,047	30,582,878	36,414,114	16,543,686	.....

*These totals do not include charcoal pig iron. The 1921 production of this iron was 94,730 tons.

Iron and Steel Markets

LARGE GAIN IN PIG IRON

Output 25 Per Cent More in October
Than in September

Both Steel Works and Merchant Furnaces
Have Greatest Increase in Months—
Car Supply Better

Pig iron production in October gives a good gage of the rapid picking up of the industry after the coal strike. There was a gain of 25 per cent over the September rate and more blast furnaces are active to-day than at any time since December, 1920.

In the 31 days of October the country produced 2,637,844 tons of pig iron, or 85,092 tons a day, against 2,033,720 tons in September, or 67,791 tons a day. The steel companies increased their output 12,200 tons a day over the September rate and the merchant furnaces gained 5100 tons a day, the largest increase for them in many months.

The Steel Corporation made a net gain of 6 in active furnaces last month, the independent steel companies a gain of 14, and the merchant furnaces a gain of 9—a total of 29. On Nov. 1 the capacity of the 218 furnaces in blast was 87,935 tons a day, against 77,005 tons a day for 189 furnaces on Oct. 1.

Apparently the increase in steel output has corresponded to that in pig iron and the steel companies are operating this week at fully 75 per cent of capacity. With the rate of pig iron production to-day close to 32,000,000 tons a year, steel ingot production is probably not far from 38,000,000 tons a year.

The effect of this increased output on prices, of both pig iron and finished steel, is being watched closely by both buyers and sellers. In particular, attention is being directed to the Steel Corporation's decision, looked for this week, on sheet and tin plate prices for the first quarter of 1923. There has been an expectation of some advance above \$4.75 per base box for tin plate and above 3.35c. for No. 28 black sheets. This week the effect of the decline to \$38 for sheet bars is having consideration. Plans of can makers for the first half of 1923 will call for large shipments of tin plates.

Car supply for the movement of material away from mills is better on the whole, and the movement of coal to the lakes is likely to taper off in the next three weeks, further improving the car situation.

Distributors of standard steel pipe continue to urge deliveries and a good deal of construction taking large quantities of butt welded pipe is still in progress.

Bolt and nut manufacturers have been buying bars in the past week, and there is inquiry from motor car works for forging and spring steel bars for first quarter. Some bar business has come

also from agricultural works, due to implement sales in the South.

Of 3300 new cars ordered, the Louisville & Nashville bought 3100.

Six sizable fabricated steel projects have added 12,000 tons to pending lists, and awards of the week amount to fully 16,000 tons. At Chicago building permits for October exceeded those for September.

Recent price concessions have not stimulated buying in the pig iron market and even the \$25 price on Alabama iron has resulted in few sales. The trend is still downward and among the reductions of the week are \$1 on foundry grades and 50 cents on Bessemer in the Pittsburgh district; \$1 on malleable, foundry and basic at Chicago, and from \$1 to \$2 on silveries following the recent reduction of \$2. The market is dull and weak at Cleveland and Cincinnati.

Some standard Connellsville coke sold at \$7 in the past week, but blast furnace resumptions are lifting the free coke from the market and \$7.50 is nearer to-day's market.

The rush to get iron and steel imports into the country before the new tariff act went into effect, rolled up 76,393 tons in 21 days of September—greater than the figure for any calendar month since the late 'eighties. Pig iron accounted for 61 per cent of the total, scrap for 16 per cent, ferromanganese for 14 per cent and ferrosilicon for nearly 5 per cent, leaving only 4 per cent for all other items.

THE IRON AGE pig iron composite has again fallen, being now \$28.86, compared with \$32.54 at the end of September. One year ago it was under \$20.

Finished steel remains at 2.446c. per lb., THE IRON AGE composite having kept between 2.4c. and 2.5c. for nearly three months. Early last March the low point of the post-war period was reached, at 1.998c. per lb.

Pittsburgh

Keen Interest in Prices of Sheets and Tin
Plate for First Quarter

PITTSBURGH, Nov. 6.—Continued weakness in pig iron prices, which has begun to filter through to the semi-finished steel market, increases expectations of lower finished steel prices, and makes for an even quieter market than previously has been noted.

Steel manufacturers are inclined to ignore the decline in pig iron as a reason for reductions in prices on the ground that steel at its peak levels did not fully reflect the advance in either pig iron or semi-finished steel, and that such benefits as have been derived from the freight rate reductions made last July and the settlement of the coal strike with the attendant decrease in the price of fuel have been more than counterbalanced by the wage advance of 20 per cent as of Sept. 1. It is claimed in well informed quarters that not over 10 per cent of the steel which has left the mills in the past three or four months has brought the top prices reached in that period. Attention also is being directed, as a reason why prices should not de-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Nov. 7, 1922	Oct. 31, 1922	Oct. 10, 1922	Nov. 8, 1921
No. 2X, Philadelphia...	\$31.14	\$31.14	\$33.14	\$22.84
No. 2 Valley furnace...	29.00	30.00	32.50	21.00
No. 2 Southern, Cin'ti...	29.05	29.05	31.55	23.50
No. 2 Birmingham, Ala...	25.00	25.00	27.50	19.00
No. 2 foundry, Chicago...	30.00	31.00	32.00	21.00
Basic, del'd, eastern Pa...	28.14	28.50	29.50	20.50
Basic, Valley furnace...	29.00	30.00	31.00	19.00
Valley Bessemer, del. P'gh	34.27	34.77	35.27	21.96
Malleable, Chicago...	30.00	31.00	32.00	21.00
Malleable, Valley...	30.00	32.00	32.00	20.50
Gray forge, Pittsburgh...	30.77	31.27	33.77	21.96
L. S. charcoal, Chicago...	36.15	36.15	36.15	31.50
Ferromanganese, furnace	100.00	100.00	67.50**	60.00**

Rails, Billets, etc., Per Gross Ton:

	Nov. 7, 1922	Oct. 31, 1922	Oct. 10, 1922	Nov. 8, 1921
O.-h. rails, heavy, at mill	\$43.00	\$43.00	\$43.00	\$40.00
Bess. billets, Pittsburgh...	38.00	40.00	40.00	29.00
O.-h. billets, Pittsburgh...	38.00	40.00	40.00	29.00
O.-h. sheet bars, P'gh...	38.00	39.00	40.00	30.00
Porging billets, base, P'gh	45.00	45.00	45.00	35.00
O.-h. billets, Phila...	45.17	45.17	45.17	34.74
Wire rods, Pittsburgh...	45.00	45.00	45.00	40.00
Skelp, gr. steel, P'gh, lb.	2.00	2.00	2.00	1.60
Light rails at mill...	2.00	2.00	2.25	....

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.325	2.325	2.475	1.95
Iron bars, Chicago...	2.50	2.50	2.50	1.75
Steel bars, Pittsburgh...	2.00	2.00	2.00	1.50
Steel bars, Chicago...	2.10	2.10	2.10	1.75
Steel bars, New York...	2.34	2.34	2.44	1.80
Tank plates, Pittsburgh...	2.00	2.00	2.15	1.50
Tank plates, Chicago...	2.30	2.30	2.30	1.75
Tank plates, New York...	2.34	2.34	2.49	1.88
Beams, Pittsburgh...	2.00	2.00	2.00	1.50
Beams, Chicago...	2.20	2.20	2.20	1.75
Beams, New York...	2.34	2.34	2.44	1.88
Steel hoops, Pittsburgh...	2.90	2.90	2.90	2.25

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

**C.I.F.

†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Sheets, Nails and Wire,	Nov. 7, 1922	Oct. 31, 1922	Oct. 10, 1922	Nov. 8, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.35	3.35	3.50	2.90
Sheets, galv., No. 28, P'gh	4.50	4.50	4.50	3.90
Sheets, blue an'd, 9 & 10	2.60	2.60	2.60	2.25
Wire nails, Pittsburgh...	2.70	2.70	2.70	2.90
Plain wire, Pittsburgh...	2.45	2.45	2.45	2.60
Barbed wire, galv., P'gh.	3.35	3.35	3.35	3.55
Tin plate, 100-lb. box, P'gh	\$4.75	\$4.75	\$4.75	\$4.75

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$25.00	\$25.50	\$25.00	\$16.00
Carwheels, Philadelphia...	21.00	21.00	23.00	17.50
Heavy steel scrap, P'gh...	20.50	21.00	21.50	14.50
Heavy steel scrap, Phila...	16.50	17.00	18.00	12.00
Heavy steel scrap, Ch'go...	17.75	18.00	18.50	12.00
No. 1 cast, Pittsburgh...	23.50	24.00	24.00	17.50
No. 1 cast, Philadelphia...	22.00	22.00	23.00	17.50
No. 1 cast, Ch'go (net ton)	20.50	20.50	21.00	13.75
No. 1 RR. wrot, Phila...	19.00	21.00	23.00	16.50
No. 1 RR. wrot Ch'go (net)	16.50	17.00	18.25	12.50

Coke, Connellsville,

Per Net Ton at Oven:

Furnace coke, prompt...	\$7.50	\$7.50	\$11.00	\$3.00
Foundry coke, prompt...	9.00	10.00	13.00	4.25

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	14.12½	14.12½	14.12½	13.25
Electrolytic copper, refinery	13.62½	13.62½	13.75	12.75
Zinc, St. Louis...	7.10	7.10	6.62½	4.75
Zinc, New York...	7.45	7.45	6.97½	5.25
Lead, St. Louis...	6.85	6.50	6.35	4.40
Lead, New York...	7.15	6.80	6.60	4.70
Tin (Straits), New York...	38.00	37.00	33.50	28.62½
Antimony (Asiatic), N. Y.	6.60	6.70	6.75	4.75

Composite Price, Nov. 6, 1922, Finished Steel, 2.446c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets	Oct. 31, 1922, 2.446c. Oct. 10, 1922, 2.460c. Nov. 8, 1921, 2.135c. 10-year pre-war average, 1.689c.
These products constitute 88 per cent of the United States output of finished steel	

Composite Price, Nov. 6, 1922, Pig Iron, \$28.86 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham	Oct. 31, 1922, \$29.52 Oct. 10, 1922, 30.94 Nov. 8, 1921, 19.97 10-year pre-war average, 15.72
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cline, to the earnings statements of the steel companies for the third quarter, all of which have shown losses. Whether the argument of costs will be sufficient to sustain prices, however, is something for the future to disclose. If precedent counts for anything, costs will not have a great deal of bearing upon the market the course of which will be determined largely by how badly the mills need business. Outside of the Steel Corporation, it is doubtful whether there are many companies which are so heavily obligated that they will not be seeking additional business before the end of the year.

The car supply for the movement of material away from the mills on the whole is better, and with the movement of coal to the lakes likely to taper off considerably in about two or three weeks, the outlook is for further improvement in the situation. Makers of pipe still complain of their inability to secure a sufficient number of cars. Demand still is exceedingly strong. A good demand also is noted for nails and most other wire products, but this also is explained by an uneven distribution due to car shortages. In other directions, buyers are falling back on contracted

tonnages and evidently are receiving ample supplies in view of the fact that strictly new business is extremely light. Announcement of first quarter of 1923 prices on those products which are sold over definite periods is awaited with unusual interest. Announcement with regard to sheet and tin plate prices by the American Sheet & Tinplate Co. is expected later this week, and there is a good deal of guessing as to what will be done. The more common expectation is that advances will be made in both sheets and tin plate, but now that sheet bar prices have begun to work down, there is some doubt that any change at all will be made.

Steel works operations in this and nearby districts are holding up well, averaging better than 75 per cent, and there have been a couple of additions to the active list of blast furnaces. The Carnegie Steel Co. has lighted its Neville furnace and now has 40 furnaces making iron, the largest number in blast at any one time this year. The Cambria Steel Co. has put on a furnace at Johnstown, Pa., and now has seven of 11 furnaces in blast. Out of a total of 139 furnaces in this and nearby districts, 88 are active, 12 more than were blowing at the previous high point at the end of

last June, and 38 more than were active at the low point at the end of August.

Pig Iron.—Deflation of prices continues, the past week having brought a further decline of \$1 per ton in basic and foundry grades, and 50c. per ton in Bessemer. The market on basic and foundry iron now is quotable at \$29, Valley Furnace, and as producers are more anxious to sell than buyers are to take hold, and prices do not yet fully reflect the decline in coke costs, it is probable that the next sales will be at even lower prices. A sanitary ware manufacturer recently was able to secure 1000 tons of No. 2 foundry iron at \$29, Valley furnace, for immediate delivery, and we note sales of basic iron aggregating about 2000 tons at \$29, Valley furnace. Gray forge iron also has been sold at \$29, Valley furnace. Only small lots of Bessemer have been sold from Valley furnaces and these have been at \$33. A sale of 1000 tons of this grade, however, is noted at \$32, Johnstown, and it is probable that as Valley makers now are offering tonnages at \$32.50, they would meet the Johnstown price on a sizable order. We note a few sales of low phosphorus copper-free iron at \$37.50, Valley.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being \$1.77 per gross ton:

Basic	\$29.00
Bessemer	\$32.50 to \$33.00
Gray forge	29.00
No. 3 foundry	29.00 to 30.00
No. 3 foundry	29.00
Malleable	30.00
Low phosphorus, copper free	37.00 to 38.00

Ferroalloys.—The trade here is experiencing very quiet times, for while steel works operations are at a rate to indicate heavy consumption, most users have ample stocks for this year's requirements and are doing almost no new buying. Such sales as are being made are small and provide no real idea as to prices that will prevail when contracting starts up again. The market may be described as firm, but is entirely nominal at present. Ferrotungsten is held a little more firmly and 95c per lb. contained tungsten, f.o.b. makers' works, now appears to be minimum.

We quote 80 per cent ferromanganese at \$100, furnace, or \$104.79 to \$104.91 delivered Pittsburgh district for domestic and \$67.50 c.i.f. Atlantic seaboard, equal to \$105.89, duty paid, delivered, for British. Average 20 per cent spiegeleisen, \$38 furnace; 16 to 19 per cent, \$37; 50 per cent ferrosilicon, domestic, \$70 to \$75, delivered. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, \$48.50; 11 per cent, \$51.80; 12 per cent, \$55.10; 13 per cent, \$59.10; 14 per cent, \$62.10; silvery iron, 6 per cent, \$37; 7 per cent, \$38; 8 per cent, \$39.50; 9 per cent, \$41.50; 10 per cent, \$43.50; 11 per cent, \$46.80; 12 per cent, \$50.10. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is \$3.66 per gross ton.

Wire Rods.—We make no change in prices this week, because the demand is sufficient to absorb the supply and buyers have not objected to paying as much as \$47.50 for small tonnages for prompt shipment. The market still is good in wire products, but other products of wire rods are beginning to slow down, this being notably so of bolts while bars are supplanting screw stock rods because they are much cheaper. Buyers figure that rods prices cannot hold up in face of the weakness in billets.

We quote No. 5 common basic or Bessemer rods to domestic consumers, \$45 to \$47.50; chain rods, \$45 to \$47.50; screw stock rods, \$50 to \$52.50; rivet and bolt rods and other rods of that character, \$45 to \$47.50; high carbon rods, \$52 to \$57.50, depending on carbon, per gross ton, f.o.b. Pittsburgh or Youngstown.

Billets, Sheet Bars and Slabs.—The market is dull and weak. The Steel Corporation has made no further purchases and nonintegrated steel makers are waiting on lower prices on the claim that they cannot operate profitably at to-day's prices of finished steel unless able to buy semi-finished material under current prices. It is more profitable for the self-contained producers to sell semi-finished than finished steel and with most makers having a surplus of the former, pressure to sell is increasing. Only an appraisal of prices is possible in the absence of definite sales, but taking into consideration the light demand, the greater desire for business and the recent declines in pig iron and scrap, \$38, Pittsburgh or Youngstown, about measures the market on sheet bars, billets and slabs. It is reported that 8000

tons of billets, the surplus tonnage of a Pittsburgh district company, recently was sold at \$37, Pittsburgh, while sheet bars have been offered at \$39 without takers.

We quote 4 x 4-in. soft Bessemer and open-hearth billets, \$38; 2 x 2-in. billets, \$39; Bessemer sheet bars, \$38; open-hearth sheet bars, \$38; slabs, \$38; forging billets, ordinary carbons, \$43 to \$45, all f.o.b. Pittsburgh or Youngstown mills.

Wire Products.—Activity still is lacking in the purely agricultural products, but demand holds good in other directions, notably in nails and spring wire and because of the rather poor performance of labor, not to mention its scarcity, makers are not cutting down their obligations with much rapidity and consequently are not free sellers. Poor transportation conditions also make it hard for manufacturers to satisfy their customers. The situation is strong now, but any change for the better in labor and transportation conditions would quickly be felt. Prices are given on page 1247.

Iron and Steel Bars.—New business is small by comparison with that of a few weeks ago, due largely to the fact that shipments against old and low-priced orders are meeting the needs of buyers. The market is holding fairly well on steel bars at 2c., base, Pittsburgh, but the explanation is that most makers have fairly good order books and, as there are no cancellations, there is not much pressure to sell. Makers seeking new tonnages, however, find it hard to get 2c. except on moderate-sized lots for early delivery. Iron bars hold at 2.60c. base, Pittsburgh for refined iron.

We quote steel bars rolled from billets at 2c.; reinforcing bars, rolled from billets, 2c. base; rail steel reinforcing bars, 1.90c. to 2c.; refined iron bars, 2.60c. in carloads, f.o.b. mill, Pittsburgh.

Plates.—Strictly new inquiries usually are for small tonnages and are not especially numerous. Too many producers now are willing to take on business at 2c. for sales to be easily made at above that figure. Prices are given on page 1247.

Iron and Steel Pipe.—Distributors of standard pipe still are urging deliveries, and makers are having considerable trouble in meeting these demands because of the scarcity of cars. A good deal of construction, which takes large quantities of butt welded pipe still is in progress, and as distributors for some time past have been able to cover only a portion of their orders, the urge for deliveries is not hard to understand. There is a fair demand for line pipe, usually for small tonnages, for extensions of repairs to existing lines, but oil well goods still are in moderate demand. Discounts are given on page 1247.

Boiler Tubes.—Demand still is reported as heavy with makers hampered in meeting their obligations, chiefly because of the lack of sufficient transportation facilities. There is no change in prices. Discounts are given on page 1247.

Steel Skelp.—Supplies are quite ample for wants and the market is barely steady at 2c. for either grooved or sheared material. Deliveries against low-priced orders now are sufficient to meet the requirements of consumers.

Sheets.—The American Sheet & Tin Plate Co. has made a further slight gain in mill operations and since it has not been taking on any new business for several weeks, it is in a fair way of getting rid of most of its obligations by the end of the year. Its carry over into next year will be chiefly in full finished stock. Independent mill operations are on a slightly smaller scale than recently because old orders are pretty well out of the way and new business is light since buyers are waiting on an announcement as to prices for the first quarter of next year. Outside of automobile sheets, there is not the demand for early delivery there was recently, and this development has pretty well canceled the delivery premiums on prices. Not over 3.50c. base now is obtainable on black sheets, while 4.60c. base appears to be top on galvanized sheets. Prices are given on page 1247.

Tin Plate.—The market is quieter, not because of any lack of interest on the part of container manufacturers, but because makers generally are sold up on this year's production and are not prepared to take on first quarter tonnages until the leading interest has announced its price. The cost argument favors an ad-

vance to at least \$5 per base box, Pittsburgh, as the official quotation, but with steel prices weakening, the matter of an advance is rendered somewhat doubtful.

Cold-Finished Steel Bars and Shafting.—There is no evidence that less than 2.50c., base, Pittsburgh, is being done on new sales, but it is also a fact that not much business is being done at that price, since deliveries on old orders, carrying lower prices, are satisfying most of the requirements of consumers. Specifications from the automotive industry are good for the time of year and locomotive builders are taking out steel steadily. Business with the agricultural implement manufacturers still is light, although it is said there is some looking round for tonnages for delivery late this year. Ground shafting is unchanged at 2.90c., base, f.o.b. mill for carloads, on new business.

Hot-Rolled Flats.—Premium prices for early deliveries have largely disappeared as consumers are more comfortably supplied as a result of better deliveries on old orders and their requirements are not as urgent as they were a short time ago. The market now is not quotable on hoops, bands or strips at above 2.90c., base, Pittsburgh. Cotton tie specifications fell considerably below early estimates because of the deterioration in the cotton crop, but makers did not produce fully and the carryover probably will be nil. Shipments practically have been completed for this season. Prices are given on page 1247.

Bolts and Nuts.—Demand has begun to taper off, because requirements are lighter in keeping with the time of year, while consumers are less apprehensive about future requirements with the steel situation showing unmistakably easier tendencies. It is said that third quarter prices have been quoted by some makers to obtain specifications on fourth quarter contracts. Discounts given on page 1247 find little basis in actual sales.

Track Fastenings.—Makers in this district are well supplied with business, most of it taken at below current quotations, and report that specifications are coming in without much prompting. New business, however, is light and prices given on page 1247 to a large extent are merely quotations.

Cold-Rolled Strips.—Buyers are specifying freely against contracts and as deliveries are heavier, strictly new business is on a smaller scale than recently. Most makers are well committed over the remainder of the year and are not shading the established base of 4.50c., Pittsburgh, on new business.

Structural Material.—This market is no longer quotable at above 2c., and sales at that level are not especially numerous, because structural projects are seasonably few and fabricating shops are getting fairly liberal shipments against old orders carrying lower prices. Since bids against structural jobs, to be successful, must be below 2c. for plain material, there is not much incentive for fabricating interests to stock up heavily at to-day's prices. Plain material prices are given on page 1247.

Steel Rails.—The market on light rails rolled from new steel, no longer is quotable above 2.15c., base, as that is said to be the Steel Corporation price and is being met by other makers. Intermittent producers of light sections still find it necessary to go as low as 2c., base, to secure orders and that price also is being asked by those rolling them from old standard sections.

We quote 25 to 45-lb. sections, rolled from new steel, 2c. to 2.15c. base; rolled from old rails, 1.90c. to 2c. base; standard rails, \$43 per gross ton mill for Bessemer and open-hearth sections.

Coke and Coal.—Standard furnace coke for spot delivery has been as low as \$7 per net ton, oven, since a week ago, but a good deal of the free coke has passed off the market as a result of recent blast furnace resumption, and the market to-day is not quotable below \$7.50 on low sulphur fuel. A few sales have been done in the past day or two at \$7.75. Coke of a quality which was used during the recent pinch in the supply is available from \$7 down to \$6.50. Foundry coke has weakened in the past week, now being quotable generally from \$9 to \$10, although one or two makers still are asking \$10.50. The coal market retains its recent firmness due

to the fact that the car supply is insufficient for all the mines now in operation. This means that a good many mines in this part of the country cannot operate anywhere nearly full and costs are high. We make no material change in prices, steam coal mine run grade being quotable at \$3.25 to \$3.50, by-product from \$3.75 to \$4.25, and gas coal, from \$4.25 to \$4.75 for mine run and \$5 to \$5.50 for lump.

Old Material.—Recent purchases of heavy melting steel by an independent steel maker here, now estimated to have been more than 70,000 tons, have not imparted the strength to the market they were expected to, because sellers did not go short or more than half the quantity and covering of sales has been helped by the fact that no other Pittsburgh steel maker has entered the market for supplies. There is no sign that the Carnegie Steel Co., contemplates purchases and other important melters here are out of the market at least for the present. A Pittsburgh district sheet plant, which has been a ready outlet for the better grades of railroad steel, no longer is taking on tonnages and the price of knuckles, couplers and springs at that plant, which recently was up to \$25, now is not over \$22. High prices were paid against the Pennsylvania Railroad scrap, but chiefly by dealers with short contracts in Canton and Massillon, Ohio. The general drift of prices is lower in keeping with pig iron and steel prices, and as is usually true of a declining market, dealers are rather anxious to sell.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel.....	\$20.50 to \$21.00
No. 1 cast, cupola size.....	23.50 to 24.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va.; Franklin and Williamsport, Pa.	22.00 to 22.50
Compressed sheet steel.....	19.50 to 20.00
Bundled sheet sides and ends...	17.00 to 17.50
Railroad knuckles and couplers...	23.00 to 23.50
Railroad coil and leaf springs...	23.00 to 23.50
Low phosphorus standard bloom and billet ends.....	24.00 to 25.00
Low phosphorus, plates and other grades.....	23.00 to 24.00
Railroad malleable.....	21.00 to 21.50
Iron car axles.....	28.00 to 30.00
Locomotive axles, steel.....	23.00 to 24.00
Steel car axles.....	23.00 to 23.50
Cast iron wheels.....	23.50 to 24.00
Rolled steel wheels.....	23.00 to 23.50
Machine shop turnings.....	16.50 to 17.00
Heavy steel axle turnings.....	18.00 to 18.50
Short shoveling turnings.....	18.00 to 18.50
Cast iron borings.....	18.00 to 18.50
Heavy breakable cast.....	19.00 to 19.50
Stove plate.....	17.00 to 17.50
Sheet bar crop ends.....	24.00 to 25.00
No. 1 railroad wrought.....	20.00 to 20.50

Rceord Building Construction

Figures compiled by F. W. Dodge Co. for the 27 Northeastern States (about three-fourths the total construction of the United States) show that the amount of building contracts in September was \$271,493,000. This is 11 per cent more than for September, 1921, and is the highest recorded September total. All building construction operations for the first nine months of the year amount to \$2,634,365,000, this being greater than the total for any full calendar year previous to 1922. The nine months' figure is 51 per cent higher than the first nine months last year.

Industrial buildings started during the month aggregated \$26,384,000; residential buildings, \$101,423,000, accounted for 37 per cent of the month's total; public works and utilities amounted to \$50,379,000; business buildings to \$45,907,000 and educational buildings to \$21,213,000. Contemplated new work reported during the month aggregated \$330,801,000.

The Victor Engineering Co., Bullitt Building, 101 South Fourth Street, Philadelphia, has been incorporated with a capital of 20,000 shares of no par stock. Its immediate business will be confined to the manufacture and installation of steam boiler accessories, including ash conveyors and ejectors, grate bars, stokers, etc. Part of the work will be done by contract. N. S. Keith is treasurer.

New York

Lethargy Among Buyers of Pig Iron and Finished Materials—Little Change in Prices

NEW YORK, Nov. 6.—The buying for delivery this year seems to be nearly ended, and there is very little interest in the market for the first quarter of next year. The most important inquiries pending are 2500 tons for an air brake company for December-January delivery, and 1000 tons for the Crane Co. for prompt delivery. Prices show little change. In eastern Pennsylvania the usual quotations range from \$29 to \$30 furnace, and at Buffalo \$28 to \$28.50 is the range. Low Moor furnace, Low Moor, Va., was blown in Nov. 6, after having been out of blast for a year and a half. There has been so little activity in Virginia iron that prices are uncertain, but it is conceded that the \$32, base, named by the leading Virginia company some time ago, cannot be maintained. On foreign irons the usual quotation on Scotch is \$29 to \$29.50, while \$27 to \$28 is quoted on Continental grades. Foreign irons still have the advantage at seaboard and nearby points in competition with domestic irons, but the latter are preferred by most melters.

We quote delivered in the New York district as follows, having added to furnace prices \$2.27 freight from eastern Pennsylvania, \$4.91 from Buffalo and \$5.44 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	\$33.27 to \$34.27
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	32.27 to 33.27
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	31.27 to 32.27
Buffalo, sil. 1.75 to 2.25	34.41
No. 2 Virginia, sil. 1.75 to 2.25	No sales

Ferroalloys.—Demand for ferromanganese continues light. There have been sales of small lots from both domestic and foreign sellers at prevailing quotations. Official data show that total imports for the year up to Sept. 21, when the tariff went into effect, had been 72,011 tons. Sales of spiegeleisen, both foreign and domestic, are also confined to small lots at prevailing quotations. No activity is reported in manganese ore, but importations continue heavy at over 62,000 tons in the first three weeks of September. The 50 per cent ferrosilicon market is reported higher, sales having been made at \$75 to \$80, delivered, but demand is light. Quotations are as follows:

Ferromanganese, domestic, furnace, nominal, per ton	\$100.00
Ferromanganese, British, c.i.f., per ton	\$67.50
Spiegeleisen, 17 to 19 per cent, furnace	\$38.00
Spiegeleisen, 20 per cent, furnace or duty paid	\$38.00 to \$39.00
Ferrosilicon, 50 per cent, delivered, per gross ton, carloads	\$75.00 to \$80.00
Ferrotungsten, per lb. of contained metal, 85c. to 95c.	
Ferrochromium, 4 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovandium, per lb. of contained vanadium	\$3.50 to \$4.00
Ferrocobaltititanium, 15 to 18 per cent, in carloads, per net ton	\$200.00

Ores

Manganese ore, foreign, per unit, c.i.f. 29c. to 30c.	
Tungsten ore, per unit, in 60 per cent concentrates, nominal	\$7.50 to \$8.00
Chrome ore, basis 48 per cent Cr ₂ O ₃ , crude, per ton, c.i.f. Atlantic seaboard	\$18.00 to \$25.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS ₂ , New York	55c. to 60c.

Cast-Iron Pipe.—Private buying continues good considering the season. No new municipal tenders are expected before the beginning of the year. It is felt that in view of the declining market on pig iron and coke and the prospect of a reduction of prices on cast-iron pipe as a result, some municipal tenders that might otherwise appear in December may be delayed. We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger \$54.50; 4-in. and 5-in., \$59; 3-in., \$64.80, with \$4 additional for Class A and gas pipe. The soil pipe market continues active and discounts from list are unchanged, although the quotations of Southern makers have developed weakness. Poor

shipments caused by the railroad embargoes have interfered with profitable purchasing by Northern buyers at these lower prices. We quote per net ton, delivered New York, discounts of both Southern and Northern makers, as follows: 2 to 6-in. standard, 25 to 30 per cent off list; heavy, 34 and 35 per cent off list.

Warehouse Business.—November has evidently opened as a better month than October with most warehouses in this district. Bars and shapes are undoubtedly the most active items carried in stock, but warehouses handling black and galvanized sheets report considerable improvement in demand this month over October business. A tendency seems evident for prices on both black and galvanized to settle to about a 4.50c. and 5.50c. per lb. basis for large lots, although a number of the warehouses are still quoting 4.90c. and 5.90c. per lb. for No. 28 gage black and galvanized, respectively. One warehouse which has been endeavoring for the past few weeks to maintain a middle price of 4.75c. and 5.75c. per lb. has dropped to the 4.50c. and 5.50c. per lb. base price, and one of the factors in sheets in this district is continuing to quote this price with 4.75c. and 5.75c. per lb. base on small lots. Wrought iron and steel pipe is active, but no price changes are expected. There is still a slight shortage of the smaller sizes of steel pipe. We quote prices on page 1268.

High Speed Steel.—Producers report an improvement in both high speed and high carbon tool steel sales, but prices of 18 per cent tungsten high speed steel continue unchanged at 75c. to 80c. per lb., with special brands of some companies ranging up to 90c. per lb.

Finished Iron and Steel.—Views of sellers are that production will continue for some months at the present rate and that prices of the heavy tonnage products will remain at the 2c Pittsburgh level with an occasional break of \$1 or \$2 per ton in the case of some large offering which a mill may especially desire to fit into its rolling schedule. Consumers are getting better deliveries and are showing no concern about future protection. Apparently they fear no advance in price or difficulty of securing material next year in the face of claims of protracted labor and car shortage. The bottom has dropped out of the export market, seeing that the world is not buying heavily and that Europe can satisfy the needs at prices sometimes \$12 and \$14 below what is asked for the American product. Any losses taken to-day in sales on foreign account must be charged against the business of, say, a decade. A round tonnage of fabricated steel work was put under contract in the week, but new projects, as is natural at this season, are conspicuous for their fewness. Not much new was learned of concrete reinforcing work. The Turner Construction Co. reported among recent contracts the Joseph J. Greenberg Building, Philadelphia; Brooklyn Daily Eagle; Reid Ice Cream Co., New York; H. B. Hardenburg & Co., Linden, N. J.; Evening Star, Washington, and American Can Co., Brooklyn, N. Y. For the 800 tons of bars for the Terminal Refrigerating Warehouse Co., Washington, the Consolidated Engineering Co., Baltimore, was low bidder. One of the large insurance companies has decided to finance a new lot of low rental apartment houses, but the projects are not yet before the steel trade. Reports also are that the financing of further railroad purchases is looked on with favor in financial circles.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, structural shapes and steel plates, 2.34c.; bar iron, 2.34c.

Coke.—Foundry grades are quoted at \$9 to \$10. Connellsville ovens, and furnace at \$7.25 to \$8. By-product coke is quoted at \$14.84 to \$14.91, delivered, Newark and Jersey City points.

Old Material.—The market is quiet and prices generally are weak. Buying for delivery to Bethlehem of heavy melting steel and some mixed borings and turnings continues. Heavy melting steel is unchanged this week at \$13.50 to \$14 per ton, while mixed borings and turnings, based upon \$15 per ton being paid delivered Bethlehem, are quotable at \$11.75 to \$12.25 per ton. Both Lebanon and Columbia mills are out of the market on specification pipe, but a Milton mill is pay-

ing \$14.50 per ton delivered. On the whole the market is not active, although prices on some items are fairly strong.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard.....	\$13.50 to \$14.00
Steel rails, short lengths, or equivalent.....	14.25 to 14.75
Rails for rolling.....	16.50 to 17.50
Relaying rails, nominal.....	27.00 to 28.00
Steel car axles.....	No market
Iron car axles.....	26.00 to 27.00
No. 1 railroad wrought.....	16.00 to 16.50
Wrought iron track.....	14.50 to 15.00
Forge fire.....	11.00 to 11.50
No. 1 yard wrought, long.....	13.50 to 14.00
Cast borings (clean).....	12.50 to 13.00
Machine-shop turnings.....	11.75 to 12.25
Mixed borings and turnings.....	11.75 to 12.25
Iron and steel pipe (1 in. diam., not under 2 ft. long).....	10.75 to 11.25
Stove plate.....	13.00 to 13.50
Locomotive grate bars.....	14.00 to 14.50
Malleable cast (railroad).....	13.50 to 14.00
Cast-iron car wheels.....	15.50 to 16.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast.....	\$20.00 to \$21.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	17.50 to 18.00
No. 1 heavy cast, not cupola size.....	15.00 to 15.50
No. 2 cast (radiators, cast boilers, etc.).....	13.50 to 14.00

Cleveland

Pig Iron Dull and Weak—Bolt and Nut Makers Buy Bars

CLEVELAND, Nov. 6.—The pig iron market continues dull and weak. The more common quotation by lake and Valley furnaces on foundry iron is \$30 for shipment to outside consuming points, but there are reports that as low as \$29 has been quoted. For local delivery one Cleveland interest has reduced its price on foundry iron 50c. a ton to \$31. The largest inquiry reported is from the American Radiator Co., 2000 tons of foundry iron for early shipment to its Detroit plant. This will probably be placed with a Detroit furnace. With a declining market, there is little buying except for immediate requirements. Considerable inquiry has come out which has not resulted in sales. There is no activity in steel making grades, but there are reports that basic iron is being offered at \$29 by some Valley makers. On Southern foundry iron the \$25 price has become fairly general, but this has not stimulated buying, as consumers are looking for further concession. Low phosphorus iron is weak owing to foreign competition. We note the sale of a 200-ton lot at \$37 by a Valley producer. The McKinney Steel Co. will blow in its Scottdale furnace, Scottdale, Pa., within a few days.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron includes a 50c. switching charge. Ohio silvery and Southern iron prices are based on a \$3.02 freight rate from Jackson and a \$6 rate from Birmingham:

Basic, Valley furnace.....	\$29.00 to \$30.00
Northern No. 2 fdy., sil. 1.75 to 2.25.....	31.50
Southern fdy., sil. 1.75 to 2.25.....	31.00
Malleable.....	31.50
Ohio silvery, sil. 8 per cent.....	42.52
Standard low phos., Valley furnace.....	37.00

Iron Ore.—Ore shipments for the season, up to Nov. 1 were 39,192,624 gross tons, indicating a total movement for the year of approximately 42,000,000 tons. October shipments were 6,081,386 tons as compared with 6,801,299 tons during September. The movement until Nov. 1 was 17,298,349 greater than during the same period last year. The total movement for 1921 was 22,300,726 tons. Several of the shippers will lay up their boats Nov. 15 and the movement will be very light after that date.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, \$5.95; Old range non-Bessemer, 51½ per cent iron, \$5.20; Mesabi Bessemer, 55 per cent iron, \$5.70; Mesabi non-Bessemer, 51½ per cent iron, \$5.05.

Semi-Finished Steel.—While there are indications of weakness and reports of lower quotations, a local producer during the week sold 2000 tons of billets at \$40. However, delivery was a factor of this sale, immediate shipment being specified. Inquiry is light.

Finished Material.—Considerable business in steel bars was booked during the week, the bolt and nut makers being the largest buyers. Some buying was also done by the implement manufacturers. While the market on the whole is quiet, some of the independent mills report that their orders are keeping up with production. Manufacturers of automobile parts are inquiring for forging and spring steel bars for the first quarter, but the delivery terms are not agreeable to the mills, which want to take the business subject to their ability to make shipment. Little change is noted in the price situation, but there are indications that the 1.95c. price that has been quoted on steel bars by at least two independent mills has been withdrawn. Round lot orders for steel bars were placed during the week at 2c., which is the commonly quoted price. On plates 2c. is the general quotation, but some mills are making small lot sales at 2.25c. Two new inquiries have come from oil interests for plates, one for 1100 tons for refinery work and the other for 600 tons for 20 stills. Structural material is commonly quoted at 2c. The seasonal slump has appeared in the demand for structural steel for building work. One large local job, a store building for the Halle Brothers Co., for which bids were received, has been held up indefinitely because of the high cost of building. The sale of a 2000-ton lot of wire rods is reported at \$49 and carload sales at \$50. The demand for light rails, which has been active, is quieter. These are quoted at 2.10c. to 2.25c., the latter price being for quick shipment from stock.

Jobbers quote steel bars, 2.91c.; plates and structural shapes, 3.01c.; No. 9 galvanized wire, 3.30c.; No. 9 annealed wire, 2.80c.; No. 28 black sheets, 4.15c. to 4.40c.; No. 28 galvanized sheets, 5c. to 5.40c.; No. 10 blue annealed sheets, 3.70c. to 3.76c.; hoops and bands, 3.71c.; cold-rolled rounds, 3.75c.; flats, squares and hexagons, 4.25c.

Sheets.—The new demand is light and some mills are running low on orders and are eager to take on tonnage. The 3.35c. price for black and 4.35c. for galvanized sheets have become more general with independent mills. Blue annealed sheets are firm at 2.60c. to 2.75c.

Warehouse Business.—Some weakness has developed in warehouse prices on black and galvanized sheets. Quotations by jobbers of 4.15c. for black and 5c. for galvanized sheets are reported.

Bolts, Nuts and Rivets.—Specifications on contracts for bolts, nuts and rivets are holding up well and prices are firm, but new buying is light.

Coke.—Coke prices still show a downward tendency. Standard Connellsville foundry coke is now quoted at \$9.50 to \$10. Buying is very limited.

Old Material.—The market is dull and unsettled with a tendency towards weakness. A few days ago dealers were paying \$22 for heavy melting steel for shipment to Valley district mills but that price brought out a great deal of material and the market for Valley delivery has settled down to about \$21.50 at which some sales to dealers have been made. Locally the same grade is being offered to consumers at \$20.50. Recent railroad offerings appear to have brought good prices, the most of the material evidently having been sold to consumers. A local dealer offered \$23.50 for couplers, knuckles and other specialties on the New York Central list for Alliance, Ohio, delivery, but that bid did not take the material. Cast scrap is weak in sympathy with the pig iron market.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel.....	\$19.00 to \$19.50
Steel rails under 3 ft.....	21.00 to 21.25
Steel rails for rolling.....	21.00 to 21.50
Iron rails.....	18.00 to 18.50
Iron car axles.....	26.00 to 27.00
Low phosphorus melting.....	20.00 to 20.50
Cast borings.....	15.00 to 15.25
Machine shop turnings.....	14.50 to 14.75
Mixed borings and short turnings.....	14.75 to 15.00
Compressed steel.....	17.00 to 17.25
Railroad wrought.....	18.00 to 18.50
Railroad malleable.....	20.00 to 21.00
Light bundled sheet stampings.....	13.75 to 14.00
Steel axle turnings.....	16.00 to 16.50
No. 1 cast.....	21.00 to 21.50
No. 1 busheling.....	12.50 to 13.50
Drop forge flashings over 10 in.....	12.75 to 13.25
Drop forge flashings under 10 in.....	12.50 to 13.50
Railroad grate bars.....	17.00 to 18.00
Stove plate.....	17.00 to 18.00
Pipes and flues.....	13.75 to 14.00

Boston

Domestic Furnaces Handicapped by Embargoes and Prices Are Steadier

BOSTON, Nov. 6.—The pig iron market appears to have been almost at a standstill the past week. A textile machinery maker in the market for 500 to 1000 tons each of low and high silicon iron is reported to have covered requirements, but details are lacking. Otherwise sales have been largely in car lots of resale, Buffalo and foreign iron, while, aside from an inquiry for 500 tons high silicon, no prospective business of importance has developed. One western Pennsylvania furnace, with a Buffalo freight rate, has met the Buffalo \$30 furnace base price. Otherwise, the price situation appears steadier, due to a tightening up in the transportation situation insofar as it bears on shipments into New England and to the fact that all but a very small percentage of the New England foundries have sufficient material on hand or on order to carry up to or through Jan. 1. Fresh embargoes have been placed by railroads serving eastern Pennsylvania furnaces, as well as by the New York, New Haven & Hartford Railroad. The uncertainty of deliveries thus created has checked further concessions by furnaces in that district. Deliveries from the Buffalo district can be made by the New York Central system, but by other routes are uncertain. Alabama shipments have slowed up, more on account of car supply than otherwise. With domestic furnaces handicapped, there is less disposition to make concessions on foreign iron.

We quote delivered prices, on the basis of the latest reported sales, now infrequent, and as follows, having added to furnace prices \$3.65 freight from eastern Pennsylvania, \$4.91 from Buffalo, \$5.92 from Virginia and \$9.60 from Alabama:

East. Penn., sil. 2.25 to 2.75.....	\$34.15 to \$36.15
East. Penn., sil. 1.75 to 2.25.....	33.65 to 35.65
Buffalo, sil. 2.25 to 2.75.....	34.91 to 36.41
Buffalo, sil. 1.75 to 2.25.....	34.91 to 35.91
Alabama, sil. 2.25 to 2.75.....	37.60
Alabama, sil. 1.75 to 2.25.....	37.10
Virginia, sil. 2.25 to 2.75.....	38.92
Virginia, sil. 1.75 to 2.25.....	37.92

Coke.—New England producers of by-product foundry coke have reduced their price 50c. a ton to \$16 delivered within the \$3.10 freight rate zone, the first reduction to be announced since February, 1922. The \$16.50 price had been in effect since Aug. 1. No spot price is named, that being left open to negotiation. The New England Coal & Coke Co. is on the point of closing its books for first half, 1923, contract fuel. The Providence Gas Co. closed its books shortly after they were opened Oct. 15. Both producers report that never before in their history has as large a tonnage been booked in any corresponding period. Shipments on last half contracts are up to the minute, and indications are that practically every pound so booked will be taken in by consumers. While some trouble has been experienced, the car supply is normal to-day. The New England Coal & Coke Co. is operating all of its 400 Otto-Hoffman ovens for the first time in many months. In addition, coking operations have been speeded up to a point where production is 100 per cent plus, if comparison is made with records of former years.

Warehouse Business.—Aside from some slowing up in the demand for bolts and nuts the volume of business passing through warehouses in this territory is holding its own. Prices for bolts and nuts are strong, notwithstanding the falling off in demand, with indications of an advance prior to Nov. 15. Stocks of iron and steel are in good condition, thereby facilitating prompt deliveries. Sheets are doing a little better than in the last part of October, and the aggregate tonnage of structural steel moving is increasing. Sheet lead has been marked up ½c. a pound and zinc ¼c.

Jobbers quote: Soft steel bars, \$3.065 per 100 lb. base; flats, \$3.85; concrete bars, 3.16½c.; structural steel, \$3.065 to \$3.50; tire steel, \$4.50 to \$4.85; open-hearth spring steel, \$5 to \$6.50; crucible spring steel, \$12; steel bands, \$4.25; hoop steel, \$4.75; cold rolled steel, \$4 to \$4.50; refined iron, \$3.065; best refined iron, \$4.50; Wayne iron, \$5.50; Norway iron, \$6.60 to \$7.10; plates, 3.16½c. to \$3.35; No. 10 blue annealed sheets, \$4.15 per 100 lb. base; No. 28 black sheets, \$5.40; No. 28 galvanized sheets, \$6.40.

Cast Iron Pipe.—An order for 500 tons of 12-in. and 625 tons of 16-in. pipe placed with R. D. Wood & Co., Philadelphia by the city of Boston, represents the only important transaction in this territory the past week. The Philadelphia firm's price was \$53.63 a ton, which compares with open market quotations heretofore of \$59.10 on 6-in. and larger delivered common Boston rate points, and \$64.10 on 4 in. Various cities and towns, as well as jobbing interests, are sounding out the market. Indications are spring business will be placed earlier than usual.

Finished Materials.—Stone & Webster have awarded 2500 tons structural steel to the McClintic-Marshall Co. for a power house at Terre Haute, Ind. No other round tonnages of this material were placed in this territory since last reports. Mill representatives report a decided slump in new buying of bars, sheets, plates and structural shapes. Users, as well as jobbers, are believed to have enough stock on hand to carry them over to the new year, and presumably have decided to await price developments. Bars are offered at less than 2c. f.o.b. Pittsburgh, six weeks' delivery.

Old Material.—The market for certain old materials has slipped off in the absence of buying, but for others, notably railroad malleable, railroad and yard wrought, shafting and axles, holds steady. Declines average 50c. a ton on those materials used outside New England. Early in the week several cars of mixed borings and turnings were purchased at \$11.95 on cars shipping point, and as much was paid for steel turnings, but the best offer to-day is \$11. This decline, and that on chemical borings, amounting to \$1 to \$1.50 a ton, represent the two weakest spots in the list. Prices on machinery cast are nominally down 50c. a ton from \$23 delivered, yet owners are still demanding 90c. a 100 lb. on cars, which figures out \$20.16 a gross ton. With an average freight of \$2.50, the delivered price is more than \$22.50. In this, as well as in other cases, it is difficult to determine a real market in the absence of actual transactions.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast.....	\$22.00 to \$22.50
No. 2 machinery cast.....	20.00 to 20.50
Stove plate.....	17.00 to 17.50
Railroad malleable.....	20.50 to 21.00

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$13.50 to \$14.50
No. 1 railroad wrought.....	16.00 to 16.50
No. 1 yard wrought.....	14.00 to 14.50
Wrought pipe (1 in. diam., over 2 ft. long).....	10.50 to 11.00
Machine shop turnings.....	11.50 to 12.00
Cast iron borings, rolling mill.....	13.50 to 14.00
Cast iron borings, chemical.....	17.00 to 17.50
Blast furnace borings and turnings.....	10.50 to 11.00
Forged scrap and bundled skeleton.....	10.50 to 11.00
Shafting.....	19.00 to 19.50
Street car axles.....	23.00 to 24.00
Street car wheels.....	17.50 to 18.00
Rails for rolling.....	15.50 to 16.00

Birmingham

Buying at New Base of \$25 Encourages Blast Furnace Operators

BIRMINGHAM, ALA., Nov. 6.—Four to six thousand tons of pig iron was sold on a base of \$25, Birmingham, by the interest opening at that base just before the close of October. Two lots of 500 tons each were taken by a large consumer and 2000 to 3000 tons were taken by one very large consumer and close buyer. That two close and heavy buyers participated in the purchasing was received with good grace by some of the makers who feared the reduced price would simply encourage demand for a still lower base. No other makers admitted following the lead of the company quoting \$25 and none of those holding for \$27 and \$27.50 claimed to be doing any but small business for rush delivery. The general quotation by other makers at the end of last week was \$27.50 and some sales were made at a base of \$28, but this tonnage was negligible. Makers generally contended that it was not at all necessary to hurry the game and say they do not propose to cut

prices with no business offering. However, the prompt taking of 4000 to 6000 tons by big buyers seems to have rather offset that theory. The Woodward Iron Co. blew in its only idle stack last week and now all five are active, one on basic for Western steel makers. One maker decreased stocks by 3000 tons during October.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25.....	\$25.00 to \$27.00
Basic	25.00 to 27.00
Charcoal, warm blast.....	32.00 to 33.00

Finishing Mills.—Practically all finishing steel mills remain on full to near full turn. The Tennessee company went to 10,000 tons of rails at Ensley this week. Its tie-plate mill has become one of its busiest and structural steel has been active for two months. Cuban points took 1000 tons of rails out of Mobile last week. The Southern Pacific's total rail order for 1923 delivery placed with the Tennessee company now amounts to 73,500 tons.

Cast Iron Pipe.—Pressure pipe makers receive a fair tonnage of new orders. The American Cast Iron Pipe Co. has booked 700 tons for Westmont, Ill., and the United States Cast Iron Pipe & Foundry Co. 730 tons for Chicago. Soil pipe is very weak, the jobbers being out of the market. Very little new business is reported at the new base of \$50 to \$55.

Old Material.—Large buyers of steel scrap have not been in the market recently. Small consumers of both steel and cast are paying the quoted prices.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	\$16.00 to \$17.00
No. 1 steel	14.00 to 16.00
No. 1 cast	18.00 to 20.00
Car wheels	18.00 to 20.00
Tramcar wheels	17.00 to 19.00
Stove plate	16.00 to 17.00
Cast-iron borings	9.00 to 10.00
Machine shop turnings.....	9.00 to 10.00

Buffalo

Pig Iron Very Weak—Good Demand for Some Finished Products

BUFFALO, Nov. 6.—Both sales and inquiry are slower than in many weeks and while none of the sellers makes announcement of sales at \$28 base, there is no question that the predicted weakening has occurred. There is hardly a sale recorded of greater than 100 tons, but there is little doubt among buyers or sellers that \$28 or possibly \$27.50 would be made on any transaction of 500 tons or greater. There is a decided slowing up of interest from New England in Buffalo iron and, of course, the importation of foreign iron is the reason thereof. Furnaces generally find that heating appliance manufacturers are the only consumers especially interested. No improvement in shipping conditions is apparent, there is no awakening of interest in first quarter business, but furnaces expect that any tendency toward firmness now would bring out considerable interest in 1923 placement. The Wickwire Steel Co. expects to blow in a furnace within a couple of weeks and the one stack now in blast is alternated between basic and foundry iron weekly.

We quote f.o.b. per gross ton Buffalo as follows, the higher prices being for early shipment:

No. 1 foundry, 2.75 to 3.25 sil.....	\$29.50
No. 2X foundry, 2.25 to 2.75 sil.....	29.00
No. 2 plain, 1.75 to 2.25 sil.....	28.50
Basic	29.00
Malleable	29.00
Lake Superior charcoal.....	36.28

Finished Iron and Steel.—A lively demand in certain finished products is not extended to bar, shape and plate business as a general proposition. For example, wire and pipe demand is extraordinary, while bar, shape and plate inquiries are moderate. There is no weakening of prices in bars, shapes or plates, and the range of 2c. to 2.15c. is practically observed by all factors with the higher figure governing on immediate or near immediate delivery. Rolling schedules enter into the price consideration on bar transactions. One mill working on a three to four week's delivery schedule is quoting

2c. on extended delivery on large tonnages, but asks 2.15c. on carload lots. Structural business is good, mostly for small sizes. Plate demand is not very active, and delivery is a four to six week proposition. New prices on tin plate have not yet appeared, though expected daily. The first quarter demand is slow. Sheets are firm. A local sheet maker has not opened its books for first quarter business. Inquiry is much brighter in sheets than kindred lines; one from the Middle West this week being for 1000 tons. The transportation situation is generally described as not much better. A contract for 1500 tons of reinforcing bars for a flour mill for Pillsbury Flour Mills Co., Buffalo, has been awarded to Corrugated Bar Co., Buffalo.

We quote warehouse prices, Buffalo, as follows: Structural shapes, 3.20c.; plates, 3.20c.; soft steel bars, 3.10c.; hoops, 4.10c.; bands, 3.90c.; blue annealed sheets, No. 10 gage, 4.05c.; galvanized steel sheets, No. 28 gage, 5.85c.; black sheets, No. 28, 4.85c.; cold rolled round shafting, 3.95c.

Warehouse.—Structural shapes are more actively sought than any other warehouse product and, it is expected that this demand will keep up until weather conditions force a suspension of construction work.

Old Material.—Several mills are buying, and there is no immediate softening of prices expected. Sales are for small lots, and dealers are trying to get more for heavy melting steel than in recent weeks. The range now is from \$19.25 to \$20. All other products are in fair demand, but the car situation continues to retard easier movement. The New York Central list, closed last week, brought \$22.50 for heavy melting steel at Cleveland with all other prices about on the line as last month.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel.....	\$20.00 to \$21.00
Low phos., 0.04 and under.....	21.00 to 22.00
No. 1 railroad wrought.....	19.00 to 20.00
Car wheels	21.00 to 22.00
Machine-shop turnings	14.50 to 15.50
Cast iron borings.....	17.50 to 18.00
Heavy axle turnings.....	17.50 to 18.50
Grate bars	16.00 to 17.00
No. 1 busheling.....	17.00 to 18.00
Stove plate	17.00 to 18.00
Bundled sheet stampings.....	14.00 to 15.00
No. 1 machinery cast.....	21.00 to 22.00
Hydraulic compressed	18.00 to 19.00
Railroad malleable	20.50 to 21.50

St. Louis

Reduction in Price of Alabama Iron Fails to Develop Orders

ST. LOUIS, Nov. 7.—The quotation of one Southern maker of \$25, Birmingham, had the effect of weakening the market for Southern iron and causing other concerns to lower prices, but it did not create any business for anybody, including the concern that made the deep cut. No other concern is quoting that low a figure. A Sheffield maker, which had been quoting \$30, made a quotation of \$27.50 when proffered some business, but did not get the order. The market may be said to be at \$25 to \$27, Birmingham, although there is not enough business being offered to afford a real test. The price of Northern iron is still at \$31, Chicago, or \$30, if sold in this territory to compete with the make of the St. Louis Coke & Chemical Co., Granite City, Ill., which is still quoting \$31.50 to \$32, f.o.b. furnace. The only sale of consequence was of 400 tons of malleable to a northern Illinois melter by the Granite City furnace, which is now making foundry iron. A few sales of a carload up to 100 tons were made. Melters are indifferent to first quarter requirements, and are playing a waiting game, buying only from hand to mouth and borrowing and trading lots among themselves. The melt is increasing and business is good, so that makers feel that it is only a question of time when they will be compelled to buy iron or close down their plants.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices \$2.16 freight from Chicago, \$3.28 from Birmingham (rail and water), \$5.17 from Birmingham, all rail, and 81 cents average switching charge from Granite City:

Northern foundry, sil. 1.75 to 2.25.....	\$32.16
Northern malleable, sil. 1.75 to 2.25.....	32.16
Basic	32.16
Southern foundry, sil. 1.75 to 2.25.....	\$30.17 to 32.17

Coke.—The market for coke is holding firm, with an active demand. The Granite City by-product concern has been operating at 100 per cent capacity since Oct. 1, and is still comfortably sold on its entire output for the next 30 or 60 days. Their price is \$14 at the oven. The best Connellsville coke is selling at \$12, ovens. Some Southern coke is being sold in here at prices to compete with the local by-product producers.

Finished Iron and Steel.—Fabricators of structural steel in Oklahoma, Missouri and Kansas are ordering material for stock, although the increase in business seems to be for rather small jobs. Jobbers are showing more interest in bars, although the volume of business placed is not large. The volume of railroad business being placed now is very light, a carload here and there, and there are no new inquiries of consequence.

For stock out of warehouse we quote: Soft steel bars, 2.90c. per lb.; iron bars, 2.90c.; structural shapes, 3c.; tank plates, 3c.; No. 10 blue annealed sheets, 4.10c.; No. 23 black sheets, cold rolled, one pass, 4.85c.; cold drawn rounds, shafting and screw stock, 3.90c.; structural rivets, 3.60c. per 100 lb.; boiler rivets, 3.70c.; tank rivets, $\frac{1}{4}$ in. and smaller, 55 per cent off list; machine bolts, large, 50 per cent; smaller, 50 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 55 per cent; hot pressed nuts, square or hexagon blank, \$2.75; and tapped, \$2.75 off list.

Old Material.—The market for old material as a whole is quiet. The weakest item is rails for rolling, which are \$1.50 lower. Some other items are off from 25c. to \$1. Consumers are not buying, and the market seems to have settled down to a basis of trading among brokers. The only railroad lists were issued by the Terminal Railway Association and the Frisco, and these were for small tonnages.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

Per Gross Ton	
Iron rails	\$20.50 to \$21.00
Rails for rolling	18.50 to 19.00
Steel rails, less than 3 ft.	21.50 to 22.00
Relaying rails, standard section	26.00 to 29.00
Cast iron car wheels	23.00 to 23.50
Heavy melting steel	17.00 to 17.50
Heavy shoveling steel	16.00 to 16.50
Frogs, switches and guards cut apart	17.00 to 17.50
Per Net Ton	
Heavy axles and tire turnings	11.50 to 12.00
Steel angle bars	17.00 to 17.50
Iron car axles	27.00 to 27.50
Steel car axles	20.00 to 20.50
Wrought iron bars and transoms	22.50 to 23.00
No. 1 railroad wrought	15.75 to 16.25
No. 2 railroad wrought	15.00 to 15.50
Railroad springs	20.00 to 20.50
Steel couplers and knuckles	21.00 to 21.50
Cast iron borings	11.00 to 11.50
No. 1 busheling	13.75 to 14.25
No. 1 railroad cast	19.00 to 19.50
No. 1 machinery cast	20.00 to 20.50
Railroad malleable	19.50 to 20.00
Machine shop turnings	9.50 to 10.00

Philadelphia

Apathy of Buyers Makes for a Very Dull Market With Prices Sagging

PHILADELPHIA, Nov. 7.—The tone of the iron and steel market is dull and weak, with buyers taking very little interest. There is general weakness in prices, but few actual changes from last week's quotations, except in scrap, some grades being from 50c. to \$2 a ton lower.

Pig Iron.—While there has been a little more inquiry for foundry iron in the past week, the inquiries are mostly for carload or 100-ton lots for prompt shipment, and in the aggregate these tonnages are only a fraction of the iron that is available. At least two Eastern furnaces are piling iron rather than to sell at to-day's prices, which remain at \$29 to \$30, furnace, for No. 2 plain; \$30 to \$31, furnace, for No. 2X and \$31 to \$32, furnace, for No. 1X. Stocks at Eastern furnaces are slowly increasing and in addition the imports of foreign iron are heavier at this port than at any time since the movement began. Last week's receipts were slightly more than 13,000 tons, coming from the following countries: Belgium, 1002 tons; Germany, 1016 tons; Nova Scotia, 1805 tons; Scotland, 2989 tons; France, 1000 tons; England, 5281 tons. While the buying of foreign iron by dealers and importers has practically stopped, the imports are likely to continue at a

fairly good rate for the next two or three months. Most of the pig iron contracts made with melters were covered by confirmed letters of credit which will insure fulfillment regardless of the trend of the domestic iron market. Final prices agreed upon between an Eastern steel company and five furnace companies in the basic iron transaction reported last week were lower than the prices reported in our issue of Nov. 2. The steel company took altogether about 16,000 tons of iron and the delivered prices ranged from \$28.14 to \$28.26. In one instance this meant a price at furnace of \$26.50 per ton. All of this iron is to be shipped in November. The slump in pig iron and steel buying has caused the Alan Wood Iron & Steel Co. to postpone the blowing in of its No. 3 furnace until about Jan. 1. It was scheduled to go in this month. Coke has been bought for a Warwick furnace, which will probably go in blast about Nov. 15. The Pulaski furnace at Pulaski, Va., is to be blown in on Wednesday. The Sheridan furnace of the Lavino Furnace Co., which has been making foundry iron, will go back on ferromanganese this week. Malleable pig iron is now offered by two or three makers at prices ranging from \$30 to \$31, furnace, and gray forge is obtainable at \$28.50 to \$30, furnace.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76 cents to \$1.64 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$30.14 to \$31.14
East. Pa. No. 2X, 2.25 to 2.75 sil.	31.14 to 32.14
East. Pa. No. 1X	32.14 to 33.14
Virginia No. 2 plain, 1.75 to 2.25 sil.	37.17
Virginia No. 2X, 2.25 to 2.75 sil.	38.17
Basic delivered eastern Pa.	28.14 to 28.26
Gray forge	29.64 to 31.14
Malleable	31.14 to 32.14
Standard low phos. (f.o.b. furnace)	38.00 to 40.00
Copper bearing low phos. (f.o.b. furnace)	37.00 to 38.00

Ore.—Foreign iron ore continues to come in freely, last week's receipts including 14,800 tons from French Africa and 5652 tons from Sweden. Recent imports of chrome ore have been quite large, most of this going to the refractories industry. Last week's receipts were 1500 tons.

Coke.—Blast furnace coke is now obtainable from \$7 to \$7.50, Connellsville, and foundry coke at \$8.50 to \$9.50, depending upon quality. There have been a few sales of spot furnace coke to Eastern furnaces.

Ferroalloys.—The British price is without change at \$67.50, c.i.f. Atlantic port, and domestic makers continue to quote \$100, furnace, on ferromanganese.

Semi-Finished Steel.—There has been no change in quotations on billets, \$40, Pittsburgh, for rerolling quality and \$45 for forging quality being the usual prices.

Plates.—At the low rate at which orders are being booked, some of the Eastern plate mills will run out of business before the end of the year. Some are much closer than that to the end of their schedules. There is very little buying of plates. The mills see no use in making price concessions on the few orders that are obtainable, hence 2c., Pittsburgh, is generally quoted on specification steel. On ordinary tank steel in large lots it is not questioned that some mills would quote 1.95c., Pittsburgh. An Eastern shipbuilding company is getting prices on 1900 tons for car ferries and floats.

Structural Material.—Very little new structural steel work has come up in this district in the past two or three weeks and the mills are now busy principally in shipping steel for buildings that are under way. Plain material is fairly firm at 2c., Pittsburgh.

Bars.—Soft steel bars are generally quoted at 2c., Pittsburgh, and the only deviation from that price is on certain large tonnages of concrete reinforcing bars, which have been shaded \$1 a ton. Bar iron is weak at 2c., Pittsburgh, some shading of this price having been reported.

Sheets.—Despite the expectation that the American Sheet & Tin Plate Co. may advance its prices on sheets, the market shows no particular strength and independent mills are now nearly all willing to sell at the present prices of the leading interest, namely 2.60c. for blue annealed, 3.35c. for black and 4.35c. for galvanized. If there is any strength it is in galvanized sheets, for which some mills are able to get 4.50c.

Warehouse Business.—Philadelphia jobbers have adopted a new plan of quoting prices. One set of prices will rule hereafter for Philadelphia, another for Chester and Wilmington and still another for other points. The prices quoted for local delivery are as follows:

Soft steel bars and small shapes, 3.025c.; iron bars (except bands), 3.025c.; round edge iron, 3.20c.; round edge steel, iron finish, $1\frac{1}{2} \times \frac{1}{2}$ in., 3.20c.; round edge steel planished, 4c.; tank steel plates, $\frac{1}{4}$ -in. and heavier, 3.125c.; tank steel plates, $\frac{3}{16}$ -in., 3.33c.; blue annealed steel sheets, No. 10 gage, 3.85c.; black sheets, No. 28 gage, 4.60c.; galvanized sheets, No. 28 gage, 5.75c.; square twisted and deformed steel bars, 3.15c.; structural shapes, 3.125c.; diamond pattern plates, $\frac{1}{4}$ -in., 4.80c.; $\frac{3}{16}$ -in., 5c.; spring No. 13 gage and lighter, 4.25c.; steel bands, No. 12 and hexagons, cold-rolled steel, 4.35c.; steel hoops, gage to $\frac{3}{16}$ -in., inclusive, 3.825c.; rails, 3.025c.; tool steel, 4.25c.; round cold-rolled steel, 3.85c.; squares steel, 8.50c.; Norway iron, 6.50c.

Old Material.—The scrap market continues to show marked weakness. Lower prices are registered whenever sales take place, but many of the current sales are due to forced shipments and give the market a weaker tone than is perhaps justified by other conditions. For example, one sale of 500 tons of No. 1 railroad wrought was made at \$18, delivered, but it is doubtful whether this low figure represents the market generally and this grade probably is quotable at \$19 to \$20. A steel company bought 300 tons of structural crop ends at \$16.39, delivered, the lowest price reached on high grade melting steel since September. No. 1 forge fire has been sold at \$15.50, bundled sheets at \$15, pipe at \$14.50 and shafting at \$21.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel.....	\$16.50 to \$17.50
Scrap rails	16.50 to 17.50
Steel rails for rolling.....	20.50 to 21.00
No. 1 low phos., heavy 0.04 and under	24.00 to 25.00
Cast iron car wheels.....	21.00 to 22.00
No. 1 railroad wrought.....	19.00 to 20.00
No. 1 yard wrought.....	19.00 to 20.00
No. 1 forge fire.....	15.50 to 16.00
Bundled sheets (for steel works)	15.00 to 16.00
No. 1 busheling.....	15.50 to 16.00
Turnings (short shoveling grade for blast furnace use).....	15.50 to 16.00
Mixed borings and turnings (for blast furnace use).....	15.50 to 16.00
Machine shop turnings (for steel works use)	15.50 to 16.00
Machine shop turnings (for rolling mill use).....	15.50 to 16.00
Heavy axle turnings (or equivalent)	16.00 to 17.00
Cast borings (for steel works and rolling mills).....	16.00 to 16.50
Cast borings (for chemical plants)	22.00 to 23.00
No. 1 cast.....	22.00 to 23.00
Heavy breakable cast (for steel plants)	20.00 to 21.00
Railroad grate bars.....	17.00 to 17.50
Stove plate (for steel plant use)	17.00 to 17.50
Railroad malleable	15.50 to 16.50
Wrought iron and soft steel pipes and tubes (new specifications)	14.50 to 15.00
Shafting	21.00 to 22.00
Steel axles	27.50 to 28.00

Detroit Scrap Market

DETROIT, Nov. 6.—The prices on all scrap material remained approximately the same as quoted a week ago. The Dodge awards for November delivery developed the fact that there were fewer manufacturers and furnaces bidding on this tonnage but a corresponding increase in the number of dealers. The following prices are on a gross ton basis, f.o.b. cars producers' yards, excepting stove plate, automobile and No. 1 machinery cast, which are quoted on a net ton basis:

Heavy melting steel.....	\$16.00 to \$17.00
Shoveling steel	16.00 to 17.00
No. 1 machinery cast.....	21.00 to 23.00
Cast borings	13.00 to 14.00
Automobile cast scrap.....	23.00 to 25.00
Stove plate	21.00 to 23.00
Hydraulic compressed	16.50 to 17.50
Car wheels	21.00 to 22.00

Chicago

Pig Iron Prices Decline \$1 — Unexpected Activity in Building

CHICAGO, Nov. 6.—Production continues to improve, although steel works have been unable to accumulate coal reserves. The Illinois Steel Co. has added a blast furnace at Gary, so that it now has 17 active stacks out of its 29. It has also increased its steel output to 74 per cent of ingot capacity. The Wisconsin Steel Co., which blew in a second blast furnace last week, is now rolling steel at the rate of 80 per cent of capacity. The operations of the Inland Steel Co. remained unchanged. Transportation is considerably improved, although coking coal is not coming into this district in the volume desired. This is probably due in large measure to the concentration on shipments to Lake Erie ports for movement by water to the Northwest. With a continuance of good weather, it is hoped that it would be possible to satisfy Northwestern needs before another month has passed, and that shipments in greater quantity will then move to this district.

The lack of fuel is hardly more serious than the scarcity of labor. It is believed, however, that the arrival of cold weather will cause many men to seek inside work.

In finished steel products, there is little change in prices, but pig iron is weak with a minimum of buying.

Pig Iron.—Buying is very light and prices are weak. Current demand is confined to spot iron, and there is a notable lack of interest in first quarter requirements. The decline in inquiry cannot be attributed to a falling off in industrial activity, as melters appear to be as busy as at any time this year. Neither do they have heavy stocks, as they are pressing for deliveries against contracts. Apparently they are remaining out of the market in the belief that prices will decline. Their apathy has, in fact, brought out some price shading, sales having been made at various base prices all the way from \$31, furnace, down to \$30. Sizable sales have been exceptional, among them a few thousand tons of local off basic. The sharp decline in Southern iron has developed little buying, notwithstanding marked improvement in shipments from the South. Addition sellers are quoting \$25 base, Birmingham, but we note one sale of 300 tons at \$26. Silvery is soft and has been offered at from \$2 to \$3 under the new prices announced last week. No sales are reported, however. Despite foreign competition, several hundred tons of domestic low phosphorus have again been sold to a Chicago district buyer at \$38, Valley furnace. A Michigan melter has put out a tentative inquiry for 1000 to 1500 tons of Southern foundry, 2.25 to 2.75 per cent silicon, for first quarter.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	\$36.15
Northern coke, No. 1, sil. 2.25 to 2.75	\$31.00 to 32.00
Northern coke, foundry, No. 2, sil. 1.75 to 2.25.....	30.00 to 31.00
Northern high phos.....	30.00 to 31.00
Southern No. 2.....	31.00 to 32.00
Malleable, not over 2.25 sil.....	30.00 to 31.00
Basic	30.00 to 31.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free.....	28.00
Silvery, sil. 8 per cent.....	44.29

Ferroalloys.—Outside of a few carload sales, ferro-manganese is quiet and unchanged as to price. Spiegel-eisen is now available at as low as \$46.05, delivered.

We quote 80 per cent ferromanganese, \$108.66, delivered; 50 per cent ferrosilicon, \$65 delivered (nominal); spiegel-eisen, 18 to 22 per cent, \$46.05 to \$47, delivered.

Bars.—Demand for soft steel bars is still of satisfactory volume, although not so brisk as some weeks ago. The agricultural implement makers, who were believed to have covered their requirements, are now

coming in for some additional tonnage. This unexpected development is accounted for by implement sales in the South. Instead of curtailing their operations, farm equipment manufacturers look forward to a slight improvement over the output which they have been able to maintain thus far this year. The railroads, the car builders, the automobile industry and reinforcing bar sellers continue to seek tonnage. Bar iron remains quiet with prices unchanged. Demand for hard steel bars is not so heavy as a month ago, but prices remain firm.

Mill prices are: Mild steel bars, 2c. to 2.10c., Chicago; common bar iron, 2.50c., Chicago; rail steel, 2c., Chicago mill.

Jobbers quote 2.80c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.80c. for rounds and 4.30c. for flats, squares and hexagons.

Jobbers quote hard and medium deformed steel bars at 2.50c. base; hoops, 4.15c.; bands, 3.55c.

Plates.—Car builders, tank fabricators and railroads are still active buyers of plates, as well as shapes and bars. Fully 500,000 tons of steel will be required by cars now on inquiry. Two oil storage tank inquiries involve a total of 12,000 tons of plates.

The mill quotation is 2.10c. to 2.30c., Chicago. Jobbers quote 2.90c. for plates out of stock.

Wire Products.—Specifications are heavier than for some weeks, and while they are confined largely to nails and plain wire, some excellent business in barbed wire has also come in, notwithstanding the fact that the season for fence building is practically over. Slightly more favorable reports are heard from the agricultural sections, particularly from the South. The plants of the leading interest have been unable to increase operations materially, those mills now running being on a 60 per cent basis. It seems probable that production will continue to fall short of demand for some time. For mill prices, see finished iron and steel, f.o.b. Pittsburgh, page 1247.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire and No. 9 and heavier bright basic wire, \$3.30 per 100 lb.; common wire nails, \$3.45 per 100 lb.; cement coated nails, \$2.90 per keg.

Rails and Track Supplies.—Aside from small orders for track supplies, the market is without features.

Standard Bessemer and open-hearth rails, \$43; light rails rolled from new steel, 2.15c., f.o.b. makers' mills.

Standard railroad spikes, 2.85c. to 3c., mill; track bolts with square nuts, 3.85c. to 4c., mill; iron tie plates, 2.50c.; steel tie plates, 2.35c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.50c. base and track bolts 4.50c. base.

Bolts and Nuts.—New business continues lighter than in September, but this is not surprising in view of the heavy specifications placed during that month. Bolt and nut plants are operating at a good rate and are getting improved deliveries of steel from the mills. Orders from the automobile industry continue to decline, in view of reduced operations of all plants except those making the cheaper cars. It is to be noted, however, that the falling off in automobile production is less than is generally the case at this season. Further evidences of a desire to contract for a considerable period ahead instead of buying for 30 to 60 days' requirements have appeared. The Nash Motor Co. is now in the market for nuts for 20,000 cars, or roughly its requirements during the first half of next year. There is better feeling among the farm implement makers and some fair-sized specifications for bolts and rivets have been received from them. Farm machinery orders from the South are reported to be much improved. The September discounts on bolts and nuts still rule in this market.

Jobbers quote structural rivets, 3.75c.; boiler rivets, 3.85c.; machine bolts up to $\frac{3}{4}$ x 4 in., 50 per cent off; larger sizes, 50 off; carriage bolts up to $\frac{3}{4}$ x 6 in., 45 off; larger sizes, 45 off; hot pressed nuts, squares and hexagons, tapped, \$2.75 off; blank nuts, \$2.75 off; coach or lag screws, gimlet points, square heads, 55 per cent off.

Sheets.—The local independent has not yet opened its books for first quarter, but it expects to find it necessary to allocate its tonnage in view of numerous requests for space received from customers. Eastern

mills have taken some new business in this territory at the prices quoted below.

Mill quotations are 3.35c. for No. 28 black, 2.50c. for No. 10 blue annealed and 4.35c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 84c. per 100 lb.

Jobbers quote f.o.b. Chicago, 4c. for blue annealed, 4.85c. for black and 5.85c. for galvanized.

Reinforcing Bars.—Shading of prices is growing commoner as trade slackens and sellers become more concerned about building up a winter backlog. Business for shipment from warehouse is being taken at all the way from 2.20c. to 2.50c., while good-sized tonnages for delivery from mill are being placed at from 2c. to 2.10c., Chicago. Recent lettings include:

Sinclair Refining Co., plant additions, East Chicago, Ind., 500 tons, and at Houston, Tex., 500 tons, a total of 1000 tons to Truscon Steel Co.

Bryant Paper Co., paper mill, Kalamazoo, Mich., 200 tons to Truscon Steel Co.

Chicago Mill & Lumber Co., plant, Chicago, 400 tons to Kalman Steel Co.

Research Laboratory, University of Illinois, Chicago, 100 tons to Olney J. Dean & Co.

Penitentiary building, Pendleton, Ind., 150 tons to Concrete Steel Co.

Cedar Rapids, Iowa, high school building, 100 tons to Kalman Steel Co.

School, Sharon, Pa., 150 tons to Kalman Steel Co.

Bridge, Hillman, Mich., 100 tons to Kalman Steel Co.

Calumet power station, Commonwealth Edison Co., Chicago, 100 tons to Kalman Steel Co.

Pending business includes:

Spoor apartment hotel, Chicago, 500 tons.

Steel Castings.—The miscellaneous castings for fully 38,000 cars recently ordered have not yet been placed, and there is also considerable castings work for locomotives pending. Steel foundries therefore expect to maintain their present favorable operations. There is now less talk of further advances in car castings, although, if labor costs continue to go up, such action may prove necessary.

Structural Material.—Building activity is showing unexpected buoyancy for this season. Permits issued in this city in October exceeded those for September. New fabricating inquiries involve a total of 25,000 tons of steel, the individual jobs ranging from a few hundred tons up to 6000 tons.

The mill quotation on plain material is 2.10c. to 2.20c., Chicago. Jobbers quote 2.90c. for plain material out of warehouse.

Cast-Iron Pipe.—Transportation conditions are steadily improving, but interest in the market continues to lag and it is probable that prospective buyers regard the weakness of Southern pig iron as a cue to postpone their purchases of pipe. Nokomis, Ill., has rejected bids on 160 tons. Ferndale, Mich., has awarded 400 tons to James B. Clow & Sons. Marlin, Tex., have let 566 tons of 6-in. to the National Cast Iron Pipe Co. A private inquiry is pending for 150 tons of 6-in. for a subdivision extension.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., \$55.20 to \$57.20; 6-in. and above, \$51.20 to \$53.20; class A and gas pipe, \$3 extra.

Warehouse Prices.—Local jobbers in iron and steel have made no changes in prices and apparently none is in prospect. Business is in good volume and is steadily expanding, coming from a greater diversity of users. Notable among buyers are manufacturers of products used in building construction, particularly in interior equipment. The effects of railroad car buying are also felt in warehouse orders.

Old Material.—Weakness is more pronounced and prices of most grades of scrap continue to decline. Various factors contributing to this condition include the lack of buying by the large users, the indefinite shut-down of one bar iron mill and an embargo on shipments to another until Nov. 20, liberal offerings by holders of scrap who desire to liquidate before the market sinks lower, better shipments from the railroads as well as from country dealers and a weaker tone in the pig iron market. An uncertain element which may materially affect the future course of prices is the weather. The unusually mild temperatures which have prevailed up to this time have facilitated the collection and prepara-

tion of scrap and a continuance of favorable weather would greatly augment the supply of materials available. While consumer buying is at a low ebb, the current melt of scrap shows no decline and in some directions is increasing. Railroad lists include the Great Northern, 1000 tons, and the Chicago & Eastern Illinois, 600 tons.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$23.50 to \$24.00
Cast iron car wheels	25.00 to 25.50
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65-lb. and heavier	32.00 to 35.00
Rolls for forged steel car wheels	22.50 to 23.00
Rolls for rolling	19.00 to 19.50
Steel rails, less than 3 ft.	20.50 to 21.00
Heavy melting steel	17.75 to 18.25
Progs, switches and guards cut apart	17.75 to 18.25
Shovelling steel	17.50 to 18.00
Drop forge flashings	12.00 to 12.50
Hydraulic compressed sheet	15.00 to 15.50
Axle turnings	15.50 to 16.00

Per Net Ton	
Iron angles and splice bars	22.50 to 23.00
Steel angle bars	17.50 to 18.00
Iron arch bars and transoms	22.00 to 22.50
Iron car axles	24.50 to 25.00
Steel car axles	19.00 to 19.50
No. 1 busheling	14.50 to 15.00
No. 2 busheling	10.00 to 10.50
Cut forge	15.50 to 16.00
Pipe and flues	11.50 to 12.00
No. 1 railroad wrought	16.50 to 17.00
No. 2 railroad wrought	15.50 to 16.00
Steel knuckles and couplers	19.50 to 20.00
Coil springs	21.50 to 22.00
No. 1 machinery cast	20.50 to 21.00
No. 1 railroad cast	19.00 to 19.50
Low phos. punchings	17.50 to 18.00
Locomotive tires, smooth	17.50 to 18.00
Machine shop turnings	10.50 to 11.00
Cast borings	13.00 to 13.50
Stove plate	17.00 to 17.50
Grate bars	16.50 to 17.00
Brake shoes	16.50 to 17.00
Railroad malleable	21.00 to 21.50
Agricultural malleable	21.00 to 21.50

Cincinnati

Southern Ohio Pig Iron Declines \$1—Moderate Sales of Alabama Grades

CINCINNATI, Nov. 6.—While the market generally is quiet, more interest was shown last week than in the previous one, and several fair-sized sales are noted. The price situation generally speaking is weaker, and southern Ohio iron is down \$1 on a number of small sales. The Southern market remains at \$25, Birmingham, with more furnaces quoting this figure. Included in sales was one of 3000 tons of Southern iron to a pipe maker with plants in different parts of the country at \$25 base. A Virginia pipe company is reported to have purchased 1000 tons of Virginia iron at slightly under \$30, furnace. A central Ohio malleable shop bought 800 tons, divided between a lake furnace and a southern Ohio maker, at \$30, furnace. We also note a sale of 500 tons of high sulphur iron to a northern Ohio melter at slightly less than quoted for the base grade. An inquiry for 100 tons from a car manufacturing plant is the only one of consequence being figured on, melters apparently being determined to stay out of the market until absolutely forced to buy to keep running. Shipments from Tennessee furnaces are very good, but from the Birmingham district little improvement is apparent.

Based on freight rates of \$4.05 from Birmingham and \$2.27 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	\$29.05 to \$31.05
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	29.55
Ohio silvery (nominal), 8 per cent	41.77
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	32.27
Basic Northern	31.27
Malleable	32.27

Finished Material.—The demand for finished materials has tapered off somewhat in this district, and occasional orders for small tonnages represent the activity in the market. With prices showing some weakness, buyers apparently are content to await further developments, and in the meantime shipments on contracts are taking care of present demands. Tank and boiler manufacturers in the Southern districts are showing interest in first quarter plate business, and it is expected

that some fair orders will be placed within the next two or three weeks. The sheet market is showing considerable activity compared with other finished products, and prices are being pretty well maintained. While 3.40c. and 4.40c. for black and galvanized sheets have been quoted, most of the orders being placed are at 3.50c. and 4.50c., and in some cases galvanized sheets are being booked at 4.60c. Automobile body sheets continue to be in good demand at 5c. and blue annealed are quoted at 2.50c. to 2.75c., the majority of the orders being taken at 2.60c. There is only occasional demand for wire fence, carload orders being the limit. On nails, however, much activity is reported, due principally to the fact that mills have not been shipping on contracts. On bars, shapes and plates, 2c. is the going price, although on undesirable specifications 2.10c. to 2.15c. is quoted. In the structural field, no new projects have appeared, and the awards have been light.

Reinforcing Bars.—Prices on reinforcing bars have slumped off to about 2c. mill, with engineering services included. The demand is fairly heavy. Recent awards include:

Doctors' Office Building, Cincinnati, 800 tons, to Pollak Steel Co.
Office building for Railway Clerks' Brotherhood, Cincinnati, 500 tons, to Bourne-Fuller Co.
High school, Louisville, Ky., 150 tons, general contract to C. A. Koerner Co.

Warehouse Business.—Local jobbers report a big demand for concrete bars, small shapes, and wire nails. Bolts and nuts are also moving better. Prices, while having a softening tendency, are holding at previous levels.

Cincinnati jobbers quote: Iron and steel bars, 2.95c. base; reinforcing bars, 3.05c. base; hoops, 4.05c. base; bands, 3.85c. base; shapes and plates, 3.05c. base; cold-rolled rounds, 3.75c. base; cold-rolled flats, squares and hexagons, 4.25c. base; No. 10 blue annealed sheets, 4c.; No. 28 black sheets, 4.70c.; No. 28 galvanized sheets, 5.75c.; No. 9 annealed wire, \$3.10 per 100 lb.; common wire nails, \$3.20 per keg, base.

Coke.—Further reductions are noted in coke prices, with a fair demand for foundry fuel being maintained. Connellsville furnace coke is quoted at \$8 to \$8.50, and foundry \$8.50 to \$10; Wise County furnace can be had at \$8 and foundry at \$10. No change is noted in New River foundry or by-product fuels, but Pocahontas foundry is down 50c. to \$10.50.

Old Material.—Local dealers report little activity in the scrap market. The Government sold 6500 tons of shell forgings, copper bands attached, stored in Columbus, at \$20.52, and these in turn have been turned over by the buyer at a higher figure. The market generally is weaker, and prices on all grades are at least 50c. a ton lower.

We quote dealers' buying prices, f.o.b. cars Cincinnati:

Per Gross Ton	
Bundled sheets	\$12.50 to \$14.00
Iron rails	16.50 to 17.50
Relaying rails, 50 lb. and up	26.00 to 26.50
Rails for rolling	18.00 to 18.50
Heavy melting steel	17.00 to 18.00
Steel rails for melting	15.50 to 16.50
Car wheels	19.50 to 20.50

Per Net Ton	
No. 1 railroad wrought	14.00 to 14.50
Cast borings	11.00 to 11.50
Steel turnings	10.00 to 10.50
Railroad cast	17.50 to 18.50
No. 1 machinery	20.50 to 21.00
Burnt scrap	11.50 to 12.00
Iron axles	20.00 to 20.50
Locomotive tires (smooth inside)	14.00 to 15.00
Pipes and flues	8.50 to 9.00

San Francisco

SAN FRANCISCO, Oct. 31.—It can hardly be said that the steel market of the Pacific Coast is particularly active at the moment. The building industry provides the greatest and steadiest activity, as it has for several months past, all parts of the State showing a good expansion in this respect. Individual jobs, for the most part, are moderate in size, but the aggregate tonnage is very considerable. One of the most conspicuous new projects in the San Francisco region is the proposed 17-story P. G. & E. building to be located on lower Market Street. It is estimated that around 1800 tons of reinforcing bars will be involved. Several hundred tons have been contracted for a State building in Sacramento, and both Fresno and Modesto are planning good-sized structures. A new bank for Salt Lake will require

a sizable tonnage. The price of bars has shown an upward tendency of late, and at present mills are quoting \$2.95 for concrete reinforcing and \$2.70 for merchant bars, f.o.b. cars, San Francisco. Among the recent awards is 2500 tons to the American Bridge Co. for the Los Angeles bascule bridge, and 300 tons of structural steel to the Pacific Rolling Mill Co. for a Los Angeles railroad. The heavy materials have not displayed any great price changes during the past two weeks. Plates are still the most unsettled, being quoted from 2.45c. to 2.75c., or even higher, according to mill. The tonnage on the market has been moderate, but not unusually large. Sheets are holding to their levels pretty well. Specialty lines are moving consistently at good prices.

Coke.—A moderately good business is reported for the fortnight period, but again, as in the case of pig iron, the placing of new orders is greatly handicapped by shortage of steamer space, and lack of English offerings, due, it appears, to the foreign ovens being practically sold up for higher quality coke which will stand the handling in transit. Prices, accordingly, are firm, but do not show any particular variation from the levels quoted two weeks ago. A few buyers in this market have been purchasing small quantities of domestic material for prompt shipment, but prices are not yet very attractive.

Canadian Scrap Market Revives

TORONTO, Nov. 5.—The demand for iron and steel scrap materials is just beginning to show improvement after a period of stagnation that has held the market in its grip for about two years. Steel plants and foundries are entering the market both for spot delivery and for delivery later on in the year. Mills are buying heavy melting steel and turnings in larger tonnages than has been the case for some months. Foundries in their turn are placing orders for large tonnages of No. 1 machinery cast and despite the fact that dealers are offering around \$18 per net ton Toronto for this commodity, there is very little coming out and in the majority of cases scrap yards are very short of machinery cast. Other lines of scrap are also showing signs of improvement and it is the opinion of local dealers that business will be making rapid strides toward the normal stage before the beginning of the new year.

President Warner Is Optimistic

President Jonathan Warner of the Trumbull Steel Co., Warren, Ohio, voices the belief that the steel industry is about to experience a period of prosperity with more regular employment and larger wages for everyone. "We are gradually overcoming all post-war difficulties and getting back to enduring prosperity. The last quarter of the year will be the best one," he states.

The Trumbull company is establishing new production records in its strip mill department.

Scrap Rate Decision

WASHINGTON, Nov. 7.—The Interstate Commerce Commission has dismissed the complaint of Louis Cohen & Son vs. New York Central et al., the opinion holding the rate on scrap iron, \$6.30 per ton in carloads, from Newberry Junction, Pa., to Holyoke, Mass., in November 1920 and February 1921 was not unreasonable or unduly prejudicial.

A number of steel and foundry companies with property within the city limits of Pittsburgh are confronted by a stiff advance in tax valuations as a result of the recommendations of the Pittsburgh Board of Assessors. The board has been appraising industrial land values for taxing purposes over the entire city and has made increases over the former taxing valuations of anywhere from 50 to 125 per cent. This means higher taxes even if there is no change in rate of assessment and in some quarters it is believed the rate also will go up.

Improving Coal Situation

WASHINGTON, Nov. 4.—Industrial users of coal are beginning to accumulate some reserves, and the general steam coal situation may now be regarded as fairly satisfactory, according to Federal Fuel Distributor, C. E. Spens. In the greater part of the country, supplies of domestic bituminous coal are fairly well assured, states Mr. Spens, although in some sections available supplies would quickly vanish in the event of severe weather conditions and consequent retardation of transportation. For the past few weeks the average spot price for all grades of bituminous coal has steadily declined, while production figures have mounted.

The Northwest territory, for instance, served largely by lake transportation will need for all purposes approximately 4,000,000 additional tons before the close of navigation, in addition to all rail movement from Illinois, Indiana, etc., to care for its requirements until April 1. Barring unexpected difficulties, with dumpings at Lake Erie ports averaging at least 1,000,000 tons per week, it is anticipated that these requirements will be accomplished.

In Illinois the available supply on hand is low, due largely to the fact that a very considerable proportion of the coal mined within the State and adjoining territories has been, and is, moving all rail to the Northwest to supplement the Lake allotment from eastern fields. It is important that far distant communities be served at this time, nearby communities can, of course, be taken care of with little delay.

In the matter of prices of bituminous coals, the following figures will give an idea of the present trend. For the week ended Sept. 23, the average spot price of all grades of coal was \$5.06 per ton.

For the week ended Sept. 30.....	\$4.89 per ton
For the week ended Oct. 7.....	4.60 per ton
For the week ended Oct. 14.....	4.45 per ton
For the week ended Oct. 21.....	4.26 per ton

During the past few weeks the above average prices have been "held up" by the comparatively higher prices received for domestic coals, the margin between "run-of-mine" and "lump" coals having in some instances been abnormally large. The results of recent conferences, and pending conferences, with coal operators in the various districts, in the matter of maximum f.o.b. mine prices, particularly on prepared sizes of coal for household use, will undoubtedly soon be reflected in these average market prices.

The necessary distribution of coals is dependent principally upon two factors at the present time: climatic conditions and transportation. The latter factor is to a large extent dependent upon the former, although it should also be remembered in this connection that the transportation lines of this country have not yet fully recovered from the ravages of the recent railway strike, and that in addition, the offerings of tonnage of all character are almost at the peak in the history of the carriers.

Blast Furnace Notes

The Ford Motor Co. blew in its second or B furnace for the first time on Oct. 11.

For the first time in many months a furnace is operating in Virginia. The Virginia Iron, Coal & Coke Co. blew in its Max Meadows furnace on Oct. 9.

Of the 32 blast furnaces blown in during October, the independent steel companies had 16; the Steel Corporation 7 and merchant producers 9. Of the 3 furnaces blown out or banked, 2 were operated by independent steel companies and one by the Steel Corporation.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until Dec. 12, for a quantity of steel wire nails for eastern and western navy yards, schedule 273; also, until Nov. 21, for 3750 ft. of galvanized steel pipe for the Mare Island Navy Yard, San Francisco.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Plates	
Sheared, tank quality, base, per lb.	2.00c.
Structural Material	
Beams, channels, etc.	2.00c.

Iron and Steel Bars	
Soft steel bars, base, per lb.	2.00c.
Refined iron bars, base, per lb.	2.60c.

Hot-Rolled Flats	
Hoops, base, per lb.	2.90c. to 3.00c.
Bands, base, per lb.	2.90c. to 3.00c.
Strips, base, per lb.	2.90c. to 3.00c.
Cotton ties, per bundle of 45 lb.	\$1.14

Cold-Finished Steels	
Bars and shafting, base, per lb.	2.50c.
Strips, base, per lb.	4.50c.

Wire Products	
Nails, base, per keg.	\$2.70
Bright plain wire, base, per 100 lb.	2.45
Annealed fence wire, base, per 100 lb.	2.45
Spring wire, base, per 100 lb.	3.25c. to 3.35c.
Galvanized wire, base, per 100 lb.	2.95
Galvanized barbed, base, per 100 lb.	3.35
Galvanized staples, base, per keg.	3.35
Painted barbed wire, base, per 100 lb.	3.00
Polished staples, base, per keg.	3.00
Cement coated nails, base, per count keg.	2.20
Woven fence, carloads (to jobbers)	70 1/2 per cent off list
Woven fence, carloads (to retailers)	68 per cent off list

Bolts and Nuts	
Machine bolts, small, rolled threads...	60 and 5 per cent off list
Machine bolts, small, cut threads...	50 and 10 per cent off list
Machine bolts, larger and longer...	50 and 10 per cent off list
Carriage bolts, 3/4 x 6 in.	
Smaller and shorter, rolled threads,	
50, 10 and 5 per cent off list	
Cut threads	50 per cent off list
Larger and longer sizes.	50 per cent off list
Lag bolts	60 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads...	50 and 10 per cent off list
Other style heads.	20 per cent extra
Machine bolts, c.p.c. and t. nuts, 3/4 x 4 in.	
Smaller and shorter.	45 per cent off list
Larger and longer sizes.	45 per cent off list
Hot pressed square or hex. blank nuts...	\$3.25 to \$3.50 off list
Hot pressed nuts, tapped.	3.25 to 3.50 off list
C.p.c. and t. sq. or hex. nuts, blank.	3.25 to 3.50 off list
C.p.c. and t. sq. or hex. nuts, tapped.	3.25 to 3.50 off list
Semi-finished hex. nuts:	
9/16 in. and smaller, U. S. S.	75, 10 and 5 per cent off list
1/2 in. and larger, U. S. S.	70, 10 and 2 1/2 per cent off list
Small sizes, S. A. E.	80 and 5 per cent off list
S. A. E., 1/2 in. and larger.	75 and 5 per cent off list
Stove bolts in packages.	80 and 5 per cent off list
Stove bolts in bulk.	80, 5 and 2 1/2 per cent off list
Tire bolts	50, 10 and 10 per cent off list

Cap and Set Screws	
Milled square and hex. head cap screw.	75 per cent off list
Milled set screws.	75 per cent off list
Upset cap screws.	75 and 10 per cent off list
Upset set screws.	80 per cent off list

Rivets	
Large structural and ship rivets, base, per 100 lb.	\$3.15
Large boiler rivets, base, per 100 lb.	3.25
Small rivets	65 per cent off list

Track Equipment	
Spikes, 9/16 in. and larger, base, per 100 lb.	\$2.75 to \$2.85
Spikes, 1/2 in. and smaller, base, per 100 lb.	3.50
Spikes, boat and barge, base, per 100 lb.	3.50
Track bolts, base, per 100 lb.	3.85 to 4.50
Tie plates, per 100 lb.	2.35
Angle bars, base, per 100 lb.	2.75

Welded Pipe	
Butt Weld	
Inches	Steel
1/4	Black 23 1/2
1/2	Black 29 1/2
3/4	Black 35 1/2
1	Black 41 1/2
1 1/4	Black 47 1/2
1 1/2	Black 53 1/2
1 3/4	Black 59 1/2
2	Black 65 1/2
2 1/4	Black 71 1/2
2 1/2	Black 77 1/2
2 3/4	Black 83 1/2
3	Black 89 1/2
3 1/4	Black 95 1/2
3 1/2	Black 101 1/2
3 3/4	Black 107 1/2
4	Black 113 1/2
4 1/4	Black 119 1/2
4 1/2	Black 125 1/2
4 3/4	Black 131 1/2
5	Black 137 1/2
5 1/4	Black 143 1/2
5 1/2	Black 149 1/2
5 3/4	Black 155 1/2
6	Black 161 1/2
6 1/4	Black 167 1/2
6 1/2	Black 173 1/2
6 3/4	Black 179 1/2
7	Black 185 1/2
7 1/4	Black 191 1/2
7 1/2	Black 197 1/2
7 3/4	Black 203 1/2
8	Black 209 1/2
8 1/4	Black 215 1/2
8 1/2	Black 221 1/2
8 3/4	Black 227 1/2
9	Black 233 1/2
9 1/4	Black 239 1/2
9 1/2	Black 245 1/2
9 3/4	Black 251 1/2
10	Black 257 1/2
10 1/4	Black 263 1/2
10 1/2	Black 269 1/2
10 3/4	Black 275 1/2
11	Black 281 1/2
11 1/4	Black 287 1/2
11 1/2	Black 293 1/2
11 3/4	Black 299 1/2
12	Black 305 1/2
12 1/4	Black 311 1/2
12 1/2	Black 317 1/2
12 3/4	Black 323 1/2
13	Black 329 1/2
13 1/4	Black 335 1/2
13 1/2	Black 341 1/2
13 3/4	Black 347 1/2
14	Black 353 1/2
14 1/4	Black 359 1/2
14 1/2	Black 365 1/2
14 3/4	Black 371 1/2
15	Black 377 1/2
15 1/4	Black 383 1/2
15 1/2	Black 389 1/2
15 3/4	Black 395 1/2
16	Black 401 1/2
16 1/4	Black 407 1/2
16 1/2	Black 413 1/2
16 3/4	Black 419 1/2
17	Black 425 1/2
17 1/4	Black 431 1/2
17 1/2	Black 437 1/2
17 3/4	Black 443 1/2
18	Black 449 1/2
18 1/4	Black 455 1/2
18 1/2	Black 461 1/2
18 3/4	Black 467 1/2
19	Black 473 1/2
19 1/4	Black 479 1/2
19 1/2	Black 485 1/2
19 3/4	Black 491 1/2
20	Black 497 1/2
20 1/4	Black 503 1/2
20 1/2	Black 509 1/2
20 3/4	Black 515 1/2
21	Black 521 1/2
21 1/4	Black 527 1/2
21 1/2	Black 533 1/2
21 3/4	Black 539 1/2
22	Black 545 1/2
22 1/4	Black 551 1/2
22 1/2	Black 557 1/2
22 3/4	Black 563 1/2
23	Black 569 1/2
23 1/4	Black 575 1/2
23 1/2	Black 581 1/2
23 3/4	Black 587 1/2
24	Black 593 1/2
24 1/4	Black 599 1/2
24 1/2	Black 605 1/2
24 3/4	Black 611 1/2
25	Black 617 1/2
25 1/4	Black 623 1/2
25 1/2	Black 629 1/2
25 3/4	Black 635 1/2
26	Black 641 1/2
26 1/4	Black 647 1/2
26 1/2	Black 653 1/2
26 3/4	Black 659 1/2
27	Black 665 1/2
27 1/4	Black 671 1/2
27 1/2	Black 677 1/2
27 3/4	Black 683 1/2
28	Black 689 1/2
28 1/4	Black 695 1/2
28 1/2	Black 701 1/2
28 3/4	Black 707 1/2
29	Black 713 1/2
29 1/4	Black 719 1/2
29 1/2	Black 725 1/2
29 3/4	Black 731 1/2
30	Black 737 1/2
30 1/4	Black 743 1/2
30 1/2	Black 749 1/2
30 3/4	Black 755 1/2
31	Black 761 1/2
31 1/4	Black 767 1/2
31 1/2	Black 773 1/2
31 3/4	Black 779 1/2
32	Black 785 1/2
32 1/4	Black 791 1/2
32 1/2	Black 797 1/2
32 3/4	Black 803 1/2
33	Black 809 1/2
33 1/4	Black 815 1/2
33 1/2	Black 821 1/2
33 3/4	Black 827 1/2
34	Black 833 1/2
34 1/4	Black 839 1/2
34 1/2	Black 845 1/2
34 3/4	Black 851 1/2
35	Black 857 1/2
35 1/4	Black 863 1/2
35 1/2	Black 869 1/2
35 3/4	Black 875 1/2
36	Black 881 1/2
36 1/4	Black 887 1/2
36 1/2	Black 893 1/2
36 3/4	Black 899 1/2
37	Black 905 1/2
37 1/4	Black 911 1/2
37 1/2	Black 917 1/2
37 3/4	Black 923 1/2
38	Black 929 1/2
38 1/4	Black 935 1/2
38 1/2	Black 941 1/2
38 3/4	Black 947 1/2
39	Black 953 1/2
39 1/4	Black 959 1/2
39 1/2	Black 965 1/2
39 3/4	Black 971 1/2
40	Black 977 1/2
40 1/4	Black 983 1/2
40 1/2	Black 989 1/2
40 3/4	Black 995 1/2
41	Black 1001 1/2
41 1/4	Black 1007 1/2
41 1/2	Black 1013 1/2
41 3/4	Black 1019 1/2
42	Black 1025 1/2
42 1/4	Black 1031 1/2
42 1/2	Black 1037 1/2
42 3/4	Black 1043 1/2
43	Black 1049 1/2
43 1/4	Black 1055 1/2
43 1/2	Black 1061 1/2
43 3/4	Black 1067 1/2
44	Black 1073 1/2
44 1/4	Black 1079 1/2
44 1/2	Black 1085 1/2
44 3/4	Black 1091 1/2
45	Black 1097 1/2
45 1/4	Black 1103 1/2
45 1/2	Black 1109 1/2
45 3/4	Black 1115 1/2
46	Black 1121 1/2
46 1/4	Black 1127 1/2
46 1/2	Black 1133 1/2
46 3/4	Black 1139 1/2
47	Black 1145 1/2
47 1/4	Black 1151 1/2
47 1/2	Black 1157 1/2
47 3/4	Black 1163 1/2
48	Black 1169 1/2
48 1/4	Black 1175 1/2
48 1/2	Black 1181 1/2
48 3/4	Black 1187 1/2
49	Black 1193 1/2
49 1/4	Black 1199 1/2
49 1/2	Black 1205 1/2
49 3/4	Black 1211 1/2
50	Black 1217 1/2
50 1/4	Black 1223 1/2
50 1/2	Black 1229 1/2
50 3/4	Black 1235 1/2
51	Black 1241 1/2
51 1/4	Black 1247 1/2
51 1/2	Black 1253 1/2
51 3/4	Black 1259 1/2
52	Black 1265 1/2
52 1/4	Black 1271 1/2
52 1/2	Black 1277 1/2
52 3/4	Black 1283 1/2
53	Black 1289 1/2
53 1/4	Black 1295 1/2
53 1/2	Black 1301 1/2
53 3/4	Black 1307 1/2
54	Black 1313 1/2
54 1/4	Black 1319 1/2
54 1/2	Black 1325 1/2
54 3/4	Black 1331 1/2
55	Black 1337 1/2
55 1/4	Black 1343 1/2
55 1/2	Black 1349 1/2
55 3/4	Black 1355 1/2
56	Black 1361 1/2
56 1/4	Black 1367 1/2
56 1/2	Black 1373 1/2
56 3/4	Black 1379 1/2
57	Black 1385 1/2
57 1/4	Black 1391 1/2
57 1/2	Black 1397 1/2
57 3/4	Black 1403 1/2
58	Black 1409 1/2
58 1/4	Black 1415 1/2
58 1/2	Black 1421 1/2
58 3/4	Black 1427 1/2
59	Black 1433 1/2
59 1/4	Black 1439 1/2
59 1/2	Black 1445 1/2
59 3/4	Black 1451 1/2
60	Black 1457 1/2
60 1/4	Black 1463 1/2
60 1/2	Black 1469 1/2
60 3/4	Black 1475 1/2
61	Black 1481 1/2
61 1/4	Black 1487 1/2
61 1/2	Black 1493 1/2
61 3/4	Black 1499 1/2
62	Black 1505 1/2
62 1/4	Black 1511 1/2
62 1/2	Black 1517 1/2
62 3/4	Black 1523 1/2
63	Black 1529 1/2
63 1/4	Black 1535 1/2
63 1/2	Black 1541 1/2
63 3/4	Black 1547 1/2
64	Black 1553 1/2
64 1/4	Black 1559 1/2
64 1/2	Black 1565 1/2
64 3/4	Black 1571 1/2
65	Black 1577 1/2
65 1/4	Black 1583 1/2
65 1/2	Black 1589 1/2
65 3/4	Black 1595 1/2
66	Black 1601 1/2
66 1/4	Black 1607 1/2
66 1/2	Black 1613 1/2
66 3/4	Black 1619 1/2
67	Black 1625 1/2
67 1/4	Black 1631 1/2
67 1/2	Black 1637 1/2
67 3/4	Black 1643 1/2
68	Black 1649 1/2
68 1/4	Black 1655 1/2
68 1/2	Black 1661 1/2
68 3/4	Black 1667 1/2
69	Black 1673 1/2
69 1/4	Black 1679 1/2
69 1/2	Black 1685 1/2
69 3/4	Black 1691 1/2
70	Black 1697 1/2
70 1/4	Black 1703 1/2
70 1/2	Black 1709 1/2
70 3/4	Black 1715 1/2
71	Black 1721 1/2
71 1/4	Black 1727 1/2
71 1/2	Black 1733 1/2
71 3/4	Black 1739 1/2
72	Black 1745 1/2
72 1/4	Black 1751 1/2
72 1/2	Black 1757 1/2
72 3/4	Black 1763 1/2
73	Black 1769 1/2
73 1/4	Black 1775 1/2
73 1/2	Black 1781 1/2
73 3/4	Black 1787 1/2
74	Black 1793 1/2
74 1/4	Black 1799 1/2
74 1/2	Black 1805 1/2
74 3/4	Black 1811 1/2
75	Black 1817 1/2
75 1/4	Black 1823 1/2
75 1/2	Black 1829 1/2
75 3/4	Black 1835 1/2
76	Black 1841 1/2
76 1/4	Black 1847 1/2
76 1/2	Black 1853 1/2
76 3/4	Black 1859 1/2
77	Black 1865 1/2
77 1/4	Black 1871 1/2
77 1/2	Black 1877 1/2
77 3/4	Black 1883 1/2
78	Black 1889 1/2
78 1/4	Black 1895 1/2
78 1/2	Black 1901 1/2
78 3/4	Black 1907 1/2
79	Black 1913 1/2
79 1/4	Black 1919 1/2

FRENCH MARKET QUIETER

Export Demand Offsets Lighter Domestic Business—Prices Generally Unchanged

PARIS, Oct. 26.—Although French ironworks are, on the whole, kept busy on old orders, there has undoubtedly been a decline in the home demand since the beginning of this month. Raw and semi-finished materials, however, continue active, owing to the export demand; but rolled merchant products are rather neglected, with weakening prices.

Both the continued appreciation of the pound sterling and depreciation of the mark are favorably influencing French exports.

Iron Ore.—France produced in August 1,938,000 tons of iron ore, with stocks at the end of that month amounting to 3,198,000 tons, as against 3,237,000 tons at the end of July. In 1913 the corresponding average monthly production (Alsace-Lorraine included) was 3,582,000 tons.

France exported in August 599,732 tons of iron ore and during the first eight months of 1922 5,590,769 tons.

Coke.—Germany delivered to France and Luxemburg 179,000 tons of coke during the first ten days of October and 183,300 tons during the last ten days of September, of which 72 per cent went to France and 28 per cent to Luxemburg.

Foundry Pig Iron.—The blowing-in of several blast furnaces is reported, notably a third furnace at the Hauts-Fourneaux de Saulnes, Meurthe-et-Moselle, which are producing a grade of pig-iron in considerable demand.

The market for foundry iron is steady. Available supplies are scarce and, although domestic orders are restricted, some good business is being done for export, especially to the United States, Belgium, Italy and Great Britain. The average present selling price of chill-cast foundry pig iron No. 3 P. L., is about 225 fr. at producing works in Lorraine; but numerous orders are reported at prices up to 235 to 240 fr. For export, the price now quoted is 255 to 260 fr., f.o.b. Antwerp (Belgian currency). Hematite pig iron is now firm and demand is improving. Present prices are as follows, delivered:

	Francs
Northern and northwestern areas....	320 to 325
Paris area	330 to 340
Eastern area	300 to 310
Central and southern areas.....	*270 to 300

*F.o.b. works.

Imported British East Coast hematite is now offered at 325 fr., c.i.f. French northern ports. Spiegeleisen is now selling at producing works in the east of France at 350 fr. for 10 to 12 per cent mn., and 405 to 430 fr. for 12 to 18 per cent mn.

Semi-Finished Material.—The inland demand is rather inactive, but as the works have orders ahead for the next ten or twelve weeks, and there is also a good export business, notably with Great Britain, prices are firmly held and exhibit a tendency to rise. The following prices are now being quoted per metric ton on basic steel (about 20 fr. additional for open-hearth material) by some Lorraine works:

	Domestic, f.o.b. Works	Export,* f.o.b. Antwerp
Ingots	305 to 315	310 to 315
Blooms	325	320 to 325
Slabs and billets.....	340 to 350	355 to 360
Sheet billets	345 to 355	375 to 380

*Belgian currency.

Beams.—The Comptoir Sidérurgique which controls inland sales of beams and heavy rails decided, at its meeting of October 19, to leave its base price of 475 fr. on beams unchanged at least until its next assembly in November. For export, beams are quoted at 380 to 390 fr. (Belgian currency) f.o.b. Antwerp, which is equal to about 360 fr. (French currency) f.o.b. producing works.

Rails.—Rail mills are still busy on old orders. The Comptoir Sidérurgique is quoting on the home market

the base prices of 525 fr. for heavy rails and 450 fr. for sleepers. Rails of less than 14 kg. are being offered by Lorraine at 400 to 410 fr. for shorn and 440 to 450 fr. for machined rails. For export, heavy rails are quoted at 420 to 425 fr. f.o.b. Antwerp, and rails under 14 kg. (shorn) at 400 to 410 fr. (Belgian currency).

Sheets and Plates.—Contrary to expectations, the Comptoir des Tôles et Larges Plats, at its meeting of Oct. 20 resolved to leave its base prices unchanged. The following delivered quotations per metric ton steel prevail:

	Francs
Flats	610
Heavy sheets.....	650
Medium sheets.....	730
Light sheets.....	930

For export, f.o.b. Antwerp, the following prices (Belgian currency) are being quoted: Open-hearth sheets, 5 mm. and heavier, 520 to 530 fr.; Flats, 470 to 480 fr.

Rolled Merchant Iron.—This market is the most affected by the slacking of orders. Prices have receded and average now about 440 fr. at Lorraine producing works. The export price f.o.b. Antwerp (Belgian currency) is now 425 to 430 fr.

Castings.—Castings are now quieter, except in the stove branch.

The French Higher Railway Board resolved, Oct. 19, that the general revision of the whole schedule of railroad rates, which is to be proceeded with at once, must keep within a maximum limit of three times the pre-war transportation costs. At the same time, it fixed May 1, 1923, as the latest date by which the revision shall be completed.

Swedish Iron and Steel Production

The number of blast furnaces and open-hearth furnaces in Sweden shows little alteration in comparison with last year. The production of pig iron has gone back from 383,200 metric tons during the first six months of 1913 to 120,900 tons in the same period this year; that of blooms and bars from 77,700 to 14,200 tons; that of Bessemer steel from 55,600 to 19,900 tons, and that of open-hearth steel from 218,200 to 101,300 tons. The last three, however, show an improvement over last year's figures. The following table gives the iron and steel production in the first half year and in the first seven months of 1922 and 1921 in metric tons:

	First Six Months		January-July, Inclusive	
	1922	1921	1922	1921
Pig iron	120,900	206,200	140,100	225,600
Blooms and bars.....	14,200	11,900	17,200	13,800
Bessemer steel	19,900	12,000	24,100	15,400
Open-hearth steel	101,300	85,800	123,400	96,500
Crucible and electric steel	6,100	7,200	7,200	8,100
Rolled material	90,600	54,200	110,600	63,600

Plant Operations

The New Process Steel Co., Noblesville, Ind., has commenced operations at the first unit of its new local plant, recently completed, for the production of small T-rails, steel billets and structural steel specialties. Three other plant units are in course of erection and these will be placed to service as soon as completed. It is expected to give employment to more than 200 workers within 60 days. Clarence Taylor is secretary and James Hundley general manager.

The Pennsylvania Railroad has placed its Sunbury, Pa., shops on a full time basis, seven-day week, day and night, and will maintain this schedule for an indefinite period. Production is devoted to repairs on locomotives and cars.

The Victor Talking Machine Co., Camden, N. J., has adopted a capacity production schedule, with large working force.

The American Bridge Co., has all furnaces in blast at its Pencoyd Works, Manayunk, Philadelphia, with full time working schedule.

The United States Cast Iron Pipe & Foundry Co., Burlington, N. J., has adopted a full capacity operating basis, with regular working force.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
	Lake	Electro-lytic*	New York	New York	St. Louis	New York	St. Louis
Nov.	14.12 1/2	13.62 1/2	36.20	6.80	6.45	7.45	7.10
1.	14.00	13.50	36.45	7.00	6.62 1/2	7.42 1/2	7.07 1/2
2.	14.00	13.50	37.30	7.12 1/2	6.80	7.42 1/2	7.07 1/2
3.	14.12 1/2	13.62 1/2	37.75	7.15	6.85	7.42 1/2	7.07 1/2
4.	14.12 1/2	13.62 1/2	38.00	7.15	6.85	7.45	7.10

*Refinery quotation.

New York

NEW YORK, Nov. 6.

None of the markets is active except tin. Only a fair demand for copper prevails at unchanged prices. The tin market has been fairly active and prices have advanced. There has been a sharp advance in lead but the zinc market is practically unchanged.

Copper.—Consumers are still conservative and buying of copper is light. The market price depends upon the seller, with electrolytic available from one or two sources part of the week at 13.50c., refinery; most sellers, however, adhere to 13.62 1/2c., refinery. It is believed that at present very little metal is now available at the lower price and we quote the general market for electrolytic copper at 13.62 1/2c., refinery, or 13.87 1/2c., delivered. Lake copper is selling at 14c. to 14.21 1/2c., delivered.

Tin.—The feature of the market has been the sale of large quantities of Straits tin during the week, amounting to close to 1600 to 1700 tons at advancing prices. One explanation is the continued rapid advance in London, but it is generally recognized that American consumers have not covered their requirements beyond December, particularly the tin plate makers. It is also estimated that consumption and production of tin are about equal. The largest sales were made on Thursday, Nov. 2, with 500 tons, mostly features, changing hands at between 36.25c. to 36.75c. Saturday was also an active day with 400 to 500 tons sold, mostly metal on steamers afloat, at 37.62 1/2c. to 37.87 1/2c. Spot Straits tin is quoted to-day at 38c., New York, the highest price of the year, and the London market was also about £3 per ton higher than a week ago at £187 7s. 6d. for spot standard, £187 15s. for future standard and £188 15s. for spot Straits. Deliveries into consumption in October were considerably larger than estimated at 5603 tons, with 2859 tons in stock and landing on Oct. 31. Imports for the first 10 months have been 41,715 tons, as compared with 18,143 tons to Nov. 1, 1921.

Lead.—The feature of the market has been the advances made by the leading interest. On Nov. 1 the American Smelting & Refining Co. advanced its price from 6.50c. to 6.75c., New York, and on the following day, Nov. 2, from 6.75c. to 7c., New York, or \$10 per ton in two days which is the largest advance made in a long period. The outside market continues to be at a premium over the prices of the leading interest at 6.85c., St. Louis, or 7.15c., New York. Lead continues scarce with prompt metal hard to get and November lead available only to favored customers. So far as can be learned books are not yet opened for December.

Zinc.—The principal item of interest in this market has been the sale of about 7000 tons for export to England. While this is not a large amount it is of considerable importance relatively because of low stocks in this country. Domestic demand, however, is not heavy. Prime Western for early delivery is quoted at 7.10c., St. Louis, or 7.45c., New York.

Antimony.—Chinese metal for early delivery in wholesale lots is quoted at 6.60c., New York, duty paid.

Aluminum.—The leading producer in this country has not yet made public its quotations, but virgin metal, 98 to 99 per cent pure, is available from foreign producers at around 21c. per lb., duty paid.

Old Metals.—With the exception of white metals the market is featureless, scrap copper and brass being very dull, while lead is quite active. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible.....	13.25
Copper, heavy and wire.....	12.50
Copper, light and bottoms.....	11.25
Heavy machine composition.....	10.50
Brass, heavy.....	8.25
Brass, light.....	6.50
No. 1 red brass or composition turnings..	9.50
No. 1 yellow rod brass turnings.....	7.50
Lead, heavy.....	6.25
Lead, tea.....	4.75
Zinc.....	4.75

Chicago

Nov. 7.—Copper and zinc have declined while lead has advanced. Copper is exceedingly quiet with users showing no interest in anything but their immediate requirements. Zinc buying has fallen off because the extra material which galvanizers ordered to protect themselves against transportation uncertainties, is now being delivered. Lead has gone up largely because of two advances by the leading producer. Buyers experience some difficulty in obtaining their lead requirements, but the scarcity is regarded as artificial rather than real. Tin consumers remain consistently out of the market, trading being confined to dealers. Ordinarily futures would be bought on an advance, but such is not now the case. Among the old metals lead pipe alone has advanced. We quote, in carload lots, lake copper, 14.25c.; tin, 38c. to 39c.; lead, 6.85c.; spelter, 7.15c.; antimony, 8.50c., in less than carload lots. On old metals we quote copper wire, crucible shapes and copper clips, 11.50c.; copper bottoms, 9.75c.; red brass, 9c.; yellow brass, 7c.; lead pipe, 5c.; zinc, 4.75c.; pewter, No. 1, 23c.; tin foil, 26c.; block tin, 30c., all buying prices for less than carload lots.

St. Louis

Nov. 7.—Lead was strong and up 35 to 40 points for the week at 6.75c. to 6.80c., carlots, due to the advance of the leading interest. Slab zinc was up 5 points at 7.05c. to 7.10c. On old metals we quote: Light brass, 3.50c.; heavy red brass and light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; zinc, 2c.; pewter, 15c.; tin foil, 20c., tea lead, 2c. and aluminum, 9c.

Large Production of Brier Hill Steel Co. Plants

In producing 79,026 tons of ingots in October, it is believed the Brier Hill Steel Co., Youngstown, Ohio, has established a record for a 12-unit open-hearth department. The October production compares with 68,197 tons of ingots produced in September by this plant. The company's blooming mill had a total rolling tonnage in October of 74,990 tons, and 64,960 tons in September, its next best month.

During the last month but 11 of the 12 furnaces were ordinarily charged, one usually being down for relining or repairs, and the record is therefore all the more significant. Average daily production was 2550 tons, or 220 tons per furnace. Rated capacity of the units is 200 tons per day.

The company's blast furnace department also set up a new production record, in turning out 44,157 tons of pig iron, comparing with its previous best mark of 43,257 tons. The Brier Hill company operates three blast furnaces. Its Grace stack supplied 16,323 tons of iron in October, its previous high production being 16,274 tons. Its Jeannette furnace poured 17,900 tons of iron, as against its best previous mark of 17,326 tons.

A demonstration of leather belting is to be given at the Hotel Pennsylvania, New York, Nov. 16, 17 and 18, by the Leather Belting Exchange.

PERSONAL

Willis L. King, vice-president Jones & Laughlin Steel Co., Pittsburgh, is back at his desk again after an absence of several weeks due to illness, which also prevented his attendance at the recent meeting of the American Iron and Steel Institute, of which he is a vice-president. Mr. King on July 12 last rounded out 53 years in the iron and steel industry, all of which have been with the Jones & Laughlin Steel Co.

George L. Bitting, sales manager Eaton Axle Co., since its organization, took over on Nov. 1 the sales managership of the Standard Welding Co., Cleveland.



GEORGE L. BITTING

Both companies are divisions of the Standard Parts Co., that city. Mr. Bitting's new appointment is in line with the aggressive sales policy recently instituted by the Standard Parts Co. for its tubing and rim plant of which the tubing capacity alone is 50,000,000 ft. annually.

P. T. Hill succeeds his former chief as sales manager of the Eaton Axle Co. Mr. Hill has also been with the Axle company since its organization and previous to that was connected with the Torbensen Axle Co.

William Le Compte has been appointed sales manager in charge of New York territory of Jenkins Bros., 80 White Street, New York. He

has been in the sales organization of the company for 25 years.

Earl M. Hayes, who for the last five years has been general manager of the Hunter & Havens Iron & Steel Co., has been appointed general manager of steel sales with the American Tube & Stamping Co., Bridgeport, Conn. His first connection in the steel trade was with the Republic Iron & Steel Co. in 1907.

C. V. Dodge, formerly in charge of steel casting sales for the United Engineering & Foundry Co., Pittsburgh, has been promoted to assistant manager in charge of roll and steel sales. He began his career with the company in 1904 as shipping clerk at the steel foundry in Vandergrift, Pa., and was later made foreman of the chipping shop at this plant. In 1916, he was given charge of steel casting sales.

Herbert F. Perkins, vice-president International Harvester Co., Chicago, in charge of all manufacturing and raw materials operations, has been assigned to assist the president in the administration and general management of the company's affairs and to be acting president in the latter's absence. Mr. Perkins retains charge of raw material properties. Cyrus H. McCormick, Jr., works manager in charge of the Chicago tractor works and the works at Milwaukee, Akron and Springfield, Ohio, has been elected vice-president in charge of all manufacturing plants in this country, Canada and Europe. George A. Ranney, secretary and treasurer, has been elected vice-president and treasurer. W. M. Gale, assistant treasurer, was elected secretary and E. A. Johnston, manager experimental department, was appointed to a new office as director of engineering.

D. M. Pitcock, formerly superintendent of the Massillon Rolling Mill Co., Massillon, Ohio, has accepted a position as general superintendent of the Universal Steel Co., Bridgeville, Pa.

F. M. Gibson, formerly sales representative of the Consolidated Steel Corporation in Japan, recently arrived in New York. He expects to return to Japan about Jan. 1.

Harry J. Reece, formerly manager of the order department, Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, has been appointed purchasing agent, succeeding Thomas J. Keegan, resigned.

William McGonigal, for the past two years manager of sales with the Philadelphia Steel Warehouse Co., has resigned and is now connected with the specialty department, J. G. Brill Co., which handles the selling of products not connected with cars and trucks. Mr. McGonigal started in the steel business with the Cambria-Midvale Steel Co., with which he remained 15 years, resigning to become assistant manager of sales with the Camden Forge Co.

D. K. Hutchcraft, formerly vice-president of the Indiana Air Pump Co., Indianapolis, and a prominent authority on air lift pumping, has been appointed district manager of the branch office at Tulsa, Okla., recently established by the Chicago Pneumatic Tool Co., Chicago Pneumatic Building, New York.

P. D. Brown, formerly manager of the Baltimore branch of the Crucible Steel Co., has been appointed district sales manager in southern territory of the Polidi Steel Corporation of America, with headquarters at Baltimore.

J. J. Stoddard has been appointed general manager of the Lakeside Forge Co., Erie, Pa., manufacturer of drop forged wrenches and forgings. Since the first of the year he has held the position of sales manager.

George Hoeffle has been elected president and general manager of the Ferguson Furnace Co., Toledo. He has been vice-president and Eastern sales manager of that company since 1907 with headquarters in New York.

A. H. Hunter of Buffalo, has resigned as president of the Atlas Steel Corporation, Dunkirk, N. Y., a consolidation of the Atlas Crucible Steel Co. of Dunkirk and the Electric Alloy Steel Co., Youngstown, Ohio. Mr. Hunter was formerly president of the Atlas Crucible company. The position will remain vacant and the duties of president will be performed by L. J. Campbell, chairman of the board in immediate charge of the company. Mr. Campbell was previously president of the Electric Alloy company.

President James A. Farrell, of the United States Steel Corporation, arrived in New York Nov. 3 from a six weeks' European trip.

G. C. Tinsley of Youngstown, Ohio, has accepted a position with the David J. Joseph Co., dealer in pig iron and scrap metals, to head a newly organized sheet and plate department. Mr. Tinsley will be located at Cincinnati. He was formerly in charge of the Commercial Shearing & Stamping Co., Youngstown, and lately has been engaged in jobbing sheets and plate ends.

Fred A. Worthey, assistant secretary of the Standard Tank Car Co., Sharon, Pa., has been promoted to assistant general manager under C. E. Neudorfer, general manager.

A. L. Seaman has organized A. L. Seaman & Co., 549 West Washington Boulevard, Chicago, to engage in the sale of iron and steel mill products. The company has been appointed exclusive representative in Chicago territory of the American Tube & Stamping Co., Bridgeport, Conn., manufacturer of hot and cold rolled strip steel, and will handle a number of other lines. Mr. Seaman was first identified with the steel business in 1904, as a special representative in the sale of flat wire and special wires for John A. Roebling's Sons Co. In 1916 he participated in the organization of E. P. Bartlett & Co., Chicago, jobbers of iron and steel, and manufacturers' representatives. He has recently sold his interest in that company to form the organization bearing his own name.

H. F. Moore, professor at the University of Illinois, will address the tri-city chapter, American Society for Steel Treating on Nov. 23. His subject will be the Fatigue of Metals. The October meeting was held at the rooms of the Davenport Chamber of Commerce, Davenport, Iowa, on Oct. 26.

William P. Moore, who until recently was district sales manager at Harrisburg, Pa., for the Central Iron & Steel Co. of that city, has joined the sales organization of the Alan Wood Iron & Steel Co., Widener Building, Philadelphia, and will handle sales of plates.

Frank Samuel, Harrison Building, Philadelphia, sales agent in the United States for one brand of British ferromanganese, has returned from a six weeks' stay in England.

John Duncan, president Illinois Co., St. Louis, and formerly president of the Wheeling Steel & Iron Co., has been elected a director of the National Enameling & Stamping Co.

OBITUARY

ALLEN HOFFER, well known in the pig iron trade of the Cleveland and eastern Pennsylvania districts, died of pneumonia on Sunday at Douglasville, Pa., at the home of his father-in-law, James P. Roe of the Reading Iron Co., Reading, Pa., following an illness of one week. Mr. Hoffer was connected with the ore sales department of the Cleveland-Cliffs Iron Co., Cleveland, and resided in that city. He was also a director of the Trumbull-Cliffs Iron Co. He began work in the pig iron trade at the Warwick furnaces, Pottsville, Pa., when a young man and later was superintendent of blast furnaces at the Worth Brothers' steel plant at Coatesville, Pa., before the sale of that property to the Midvale Steel & Ordnance Co. Mr. Hoffer attended the meeting of the American Iron and Steel Institute in New York on Oct. 27, and the following day attended the Yale-Army football game at New Haven, Conn., where he contracted a severe cold which developed into pneumonia. Mr. Hoffer was 37 years old. He leaves a wife and two children.

GEORGE KNAPP HOBLITZELLE, 55 years old, vice-president and treasurer of the Commonwealth Steel Co., St. Louis, died at his home in that city Nov. 5. Mr. Hoblitzelle was born in St. Louis and was educated at a manual training school which then was part of Washington University. After leaving school he became connected with the Shickle, Harrison & Howard Iron Co., of which he later was made secretary. When that concern was purchased by the American Steel Foundries, he remained with the latter for a year when he, with Clarence H. Howard and H. M. Pflager purchased the Commonwealth Steel Co. in 1904. Mr. Hoblitzelle then was made vice-president and treasurer. He is survived by his wife, a daughter of John Harrison, president of the Shickle, Harrison & Howard Iron Co. A son, Harrison, is assistant treasurer of the Commonwealth Steel Co.

DRUID A. WALTON, president C. J. Walton & Son, boiler manufacturers, Louisville, Ky., hanged himself at his office on Monday afternoon, Oct. 30. The act was attributed to failing health and business depression. Mr. Walton was born in Louisville in 1864 and attended Stevens Institute of Technology from which he was graduated with high honors. He immediately became associated with the business of the late Charles J. Walton, his father, following whose death he became president 12 years ago. Mr. Walton was a member of the American Society of Mechanical Engineers.

JAMES FRANCIS FLYNN, production manager and one of the directors of the D. J. Ryan Foundry Co., Ecorse, Mich., died suddenly from pneumonia on Oct. 16, in his 39th year. Mr. Flynn was formerly associated with the Erie Railroad, later going into business for himself. His relations with the Ryan company date from its inception as successor to the Ecorse Foundry & Machine Co.

HERBERT T. GRANTHAM, vice-president and chief engineer of the Belmont Iron Works, Philadelphia, structural steel fabricator, dropped dead on the golf links of the Philadelphia Country Club on Sunday, death being due to apoplexy. Mr. Grantham was about

54 years old and had been connected with the Belmont Iron Works for 24 years. He leaves a wife and son. The funeral was held from the family residence, 178 Green Street, Germantown, Tuesday afternoon.

CHARLES J. TAGLIABUE, president C. J. Tagliabue Co., manufacturer of thermometers, Brooklyn, died suddenly Nov. 2 from heart trouble. Mr. Tagliabue was born in New York 70 years ago.

HUNGARIAN IRON TRADE

Stinnes an Active Factor in Supplying Balkan Markets

(Special Correspondence)

BERLIN, GERMANY, Oct. 20.—The Hungarian iron industry is strenuously working to secure the necessary raw material from other countries, and to develop its own resources. German interests are active and the new manganese deposits which have been discovered in the Vesperimer Komitat are to be exploited with the aid of the German Bank. These deposits are of special interest to the German steel industry, because it is depending for its manganese on imports. Through the peace of Trianon, Hungary lost 319 factories with 30,772 workmen and a production worth 243.7 million gold kronen, which is 47 per cent of the factories and 37.4 per cent of the value of production in its pre-war territory. Of the 359 factories which remain within present-day Hungary, 7 are producing rolled iron and steel, 9 iron and steel castings, 93 hardware, 17 wire and wire goods, 3 iron cooking utensils, 8 iron furniture, and 227 machinery. These plants employed 67,876 workmen and had a production of the value of 406.8 million gold kronen.

The importance of the Hungarian engineering industry, especially in regard to exports to the Balkans, has also been realized by Hugo Stinnes, who is pushing his organization in southeastern Europe with a view to creating a market for his Austrian Alpine Montan Gesellschaft and other works. Only recently the Jugo-Slawische Montanhütten-Syndicat A. G. was founded under his auspices in Agram by the Alpine with a capital of 3 million Jugo-Slavian kronen. Now he has made a contract with the Hungarian Liptak works, in which he acquired large interests. These works are to be enlarged and modernized, and the organization is being extended especially in the Balkan countries. The capital of the company is being increased from 100 to 180 million Hungarian kronen.

The Hungarian foreign trade was comparatively inactive during the first six months of the present year, imports being 1,390,000 metric tons valued at 35,400 million kronen, and exports 590,000 tons, valued at 27,600 million kronen. The iron exports alone amounted to over 20,000 tons, an important item being bar iron. Exports of machinery are constantly increasing, amounting to 13,600 tons, of which 5400 tons was agricultural machinery, during the first half of 1922.

Advance in Puddlers' Wages

The Reading Iron Co., Reading, Pa., announced a 10 per cent wage increase for puddlers, the rate per ton being advanced from \$8 to \$8.80. There will be no change in the common labor rate at this time.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has started the construction of the first of four units to comprise a combination distributing warehouse, repair shop and factory on West Pershing Road and Leavitt Street, Chicago.

H. J. N. Voltman, designing engineer with the W. S. Rockwell Co., New York, will address the American Society for Steel Treating at the rooms of the Providence Engineering Society, Friday, Nov. 10, on "The Turning Out of Heat-Treated Products."

FABRICATED STEEL BUSINESS

Awards Call for a Round Tonnage But Few New Projects Appear

Among the fabricated steel awards of the past week are the following:

New York Times annex, 2700 tons, to Levering & Garrigues Co. (1200 tons to be erected before the end of the year.)

Chevrolet Motor Co., Buffalo, N. Y., 200 tons, at Buffalo, to J. W. Ferguson Co., Paterson, N. J.

H. & J. Burke, Ltd., warehouse, Brooklyn, 200 tons, to Levering & Garrigues Co.

Coal pier for Virginia Railway, Sewell's Point, Norfolk, Va., 5800 tons to the Bethlehem Steel Bridge Corporation.

Transmission towers for the Virginia Railway & Power Co., 500 tons, to Milliken Brothers Mfg. Co.

Empire State Ice Co., Weehawken, N. J., 300 tons, to the Comunipaw Structural Steel Co.

Flatbush telephone exchange, 1000 tons, to the Hedden Iron Construction Co.

Six-story garage, West Fifty-fourth Street, 500 tons, to the Hinkle Iron Co.

Addition, Seneca Hotel, Rochester, N. Y., 750 tons, to the Genessee Bridge Co.

Allerton House, Chicago, 3000 tons (reported 2450 tons last week), to the Bethlehem Bridge Corporation.

Elk River Coal & Lumber Co., six bridges for Buffalo Creek & Gawley Railroad, to Phoenix Bridge Co.

Factory building for Ideal Electric & Mfg. Co., Mansfield, Ohio, 100 tons to the Austin Co.

South High School, Pittsburgh, 400 tons, Kelly Construction Co., Philadelphia, low bidder.

Warehouse, American Rolling Mills Co., Ashland, Ky., 100 tons, to McClintic-Marshall Co.

Freight station, Knoxville, Tenn., for Louisville & Nashville Railroad, 250 tons, to H. K. Ferguson Co.

San Antonio & Aransas Pass Railroad, Brazos River Bridge, near Wallis, Tex., 768 tons, to Virginia Bridge & Iron Co.

Luick Ice Cream Co., Milwaukee, 300 tons, to Milwaukee Bridge Co.

Peoples Trust & Savings Bank Building, Chicago, 700 tons, to A. Bolters Sons Co.

Structural Projects Pending

Inquiries for structural steel work now being figured on include the following:

Power house in Indiana for Stone & Webster, Inc., 2200 tons.

Lion Oil & Refining Co., Kansas City, Mo., for delivery at Pearson, Ark., nine tanks of 2000 to 10,000-bbl. capacity and six 1000-bbl. stills.

Parcels post building, Cleveland, 500 tons.

Plant for Mengel Body Co., Louisville, Ky., 500 tons, Joseph & Joseph, architects.

Third Unit Calumet Power Station, Commonwealth Edison Co., Chicago, 3000 to 3500 tons.

National Biscuit Co., New Building, Philadelphia, 3500 tons.

To Discuss Machine Tool Distribution

The fall meeting of the Machine Tool Section of the National Supply and Machinery Dealers' Association will be held at the William Penn Hotel, Pittsburgh, Tuesday, Nov. 21, at 10 o'clock in the morning. The program will focus particularly on machine tool distribution through representation by dealer agents, such as those houses comprised within the membership of the Association.

L. H. Swind, Swind Machinery Co., Philadelphia, is chairman of the section, and Thomas A. Fernley, with general offices at 505 Arch Street, Philadelphia, is secretary-treasurer. The executive committee comprises Henry Prentiss, Henry Prentiss & Co., Inc., New York; H. G. Mitchell, Harron, Rickard & McCone, San Francisco; J. W. Wright, Colcord-Wright Machinery & Supply Co., St. Louis, and George H. Cherrington, Brown & Zortman Machinery Co., Pittsburgh.

RAILROAD EQUIPMENT BUYING

Fresh Inquiries for About 500 Cars But 3300 Put Under Contract

Some 3300 cars have been put under contract but only 450, including passenger type equipment, have been added to business under negotiation. In financial circles further consideration is being given to arrangements for financing further railroad equipment requirements. Some of the week's items are as follows:

The Rock Island is inquiring for 50 suburban coaches.

The Mississippi Central wants 100 to 200 flat cars.

The Kingan Refrigerator Co. is inquiring for 100 refrigerator cars.

The Pacific Electric Co. is inquiring for 50 interurban coaches.

The Santa Fe wants 10 dining cars.

The Union Pacific has let 100 tank cars to the American Car & Foundry Co.

The Live Poultry Transportation Co. will build 100 chicken cars in its own shops.

The Chesapeake & Ohio Railroad has placed orders with the American Locomotive Co., New York, for two mountain type locomotives for passenger service, price, \$61,200 each, and six Pacific type locomotives for passenger service, price, \$56,550 each, all to be built at the Richmond works, delivery, April, 1923.

The Louisville & Nashville has placed 2100 hopper cars with the American Car & Foundry Co., and 1000 box cars equally with the Chickasaw Shipbuilding & Car Co. and the Mt. Vernon Car & Mfg. Co.

Complaint as to Steel Plate Rates Dismissed

WASHINGTON, Nov. 7.—In a decision handed down last Saturday the Interstate Commerce Commission dismissed the complaint of the Gulf Refining Co. of Louisiana, holding that the rates of 69c. and 89c. per 100 lb., on steel plates and tank material, knocked down, from Leetsdale, Pa., to Dubberly and Mansfield, La., assessed on 33 carloads to Dubberly and 11 carloads to Mansfield, between Dec. 30, 1919, and March 8, 1920, were not unreasonable or unduly prejudicial. The decision embraced another complaint of the Gulf Refining Co. regarding a similar traffic movement. It had alleged that the rates were unreasonable and unduly prejudicial to the extent that they exceeded 63c. and 83c. said to have been the contemporaneous rates on iron plates from the same point of origin to the same destinations. These rates, it was stated, would have been applicable but for the elimination through oversight of a commodity differential of 19c. as between both iron and steel plates from the Pittsburgh district to points in Texas from the Western classification when the consolidated classification was published.

Charges on Pipe Unreasonable

WASHINGTON, Nov. 7.—A finding of illegality and unreasonableness has been made by the Interstate Commerce Commission in the complaint of the Indianola Refining Co. vs. Director-General, et al., as to the charges collected on three carloads of wrought-iron and cast-iron pipe, pipe fittings, and connections from Drumright, Quay and Shamrock, Okla., to Ranger, Tex., in November and December, 1918. The commission found the charges were made on rates not applicable to the shipments moved. Class rates upward of 71c. were collected while there existed a commodity rate of 44c. from Muskogee and other points in Oklahoma in the same general territory as the points of origin involved in this complaint, to the same destinations. The commission found the charges illegal and unreasonable to the extent they exceeded 44c. from Quay, 51.5c. from Shamrock and 52c. from Drumright and ordered reparation.

Foundries at Wrightsville, Pa., comprising the Riverside Foundry Co., the Wrightsville Hardware Co. and the Susquehanna Casting Co., have advanced the wages of employees 10 per cent, effective Nov. 1.

Bases of Modern Blast Furnace Practice

(Continued from page 1208)

larger the lumps, the greater the sorting action above described and, conversely, the smaller the maximum size of the lumps the less the degree of segregation. It is therefore further obvious that, to avoid excessive segregation, the preparation of the ore by crushing the lumps to smaller, say rubble, size is necessary. This prevents excessive segregation in two ways: first, being smaller, they have less tendency to roll down the sides of the inverted cone to the apex and, secondly, the broken pieces have usually sharp and jagged edges and have, therefore, a greater tendency to lodge nearer where they fall, and the movement of the materials to the center is more likely to be en masse, carrying a certain amount of smalls with it. It is thus that preparation by crushing materially improves distribution by preventing excessive segregation, which is a condition directly inimical to the application of modern blast furnace practice.

In the distribution existing when the usual run of ores and limestone are charged "as received" there is a core or column in the center of the furnace, consisting almost entirely of the largest lumps, the area of the cross section of this core varying with the size and proportion of lumps to rubble and fines. Between this core and the walls is an annular ring consisting of a mixture of rubble and smalls, in which the proportion of rubble to smalls gradually decreases until, next to the walls, there are practically only smalls and fines.

As previously pointed out, an essential to regular and economical descent of the materials is perfect uniformity of action of the ascending gases upon the whole of every cross-section of the material in the furnace and, while this is an ideal condition which may be impossible of full attainment in actual practice, the nearest possible approach to it is of the greatest importance. There can be little approach to such a condition if the ascending gases are forced, under pressure, through a mass of materials distributed as just described. Very little, if any, of the gases will find contact with the closely packed fine materials close to the walls, and the greater proportion will pass up through the more open structure in the center, the core of large lumps, and a proportion only through the annular ring of rubble and smalls. The result of this unequal distribution of the ascending gases is the faster descent of the largest lumps in the center, and a gradually slower descent of the outlying materials. Such a descending movement of the materials of the various sizes is exactly contrary to what is most desirable. Those which descend most rapidly, owing to their slower rate of reducibility should descend most slowly, and those which descend most slowly, owing to their high rate of reducibility should descend most rapidly.

Maximum economy and output are impossible under such conditions for, apart from the question of irregularity of movement which almost always results from them, it is necessary to provide an excess of fuel to insure the complete reduction of the more rapidly descending lumps before they enter the melting zone, and the rate of driving is limited by their slower rate of reducibility. Any attempt at really fast driving under these conditions so reduces the ratio of ore to fuel which can be carried that not only is the output not increased, but the fuel consumption is greatly increased, with the added danger of the production of low grade iron through unreduced ore entering the furnace hearth from over driving, or irregular descent of the materials.

Under the conditions existing in a furnace charged in the manner under consideration there is always a strong tendency toward irregularity of movement, or none at all, in the material nearest the walls, with a gradual building up on the walls. This building up continues until portions either become permanently stationary, forming scaffolds, or masses break away and are precipitated toward the center and into the actively descending materials and rapidly ascending gases, constituting the well known slip.

This procedure is more or less frequent and more

or less severe, from the small slip, causing temporary production of off grade iron, to the heavy slip or explosion, which either blows off the furnace top, or fills the tuyeres with slag, chills the hearth, "gobbs up" the furnace and puts it out of commission for days, an evil too well known among those interested to require emphasis. But to whatever degree it occurs it seriously interferes with the regularity essential to best results. The disadvantages from the accumulated effects of these conditions are avoided, and even then not always satisfactorily, only by periodical partial clearance of the furnace walls by the use, temporarily, of considerably reduced burdens or, which is the same thing, by charging extra fuel, at the expense of both economy and output. These evils can be avoided only by the proper preparation of lumpy ores by crushing.

Fine Ores

The disturbing effects upon furnace operations of the use of any considerable proportion of very fine ores—exaggerating the conditions described under distribution—are well known. Although in modern practice furnace design and method of operation have considerably reduced these effects, such ores are still sufficiently objectionable in this respect to make advisable some treatment to change their character as fines. In this case the process of preparation is the reverse of that for lumpy ores, that is, instead of reducing, it is desirable to increase their size, in order to remove their clogging effect in the furnace and to prevent their being carried out in excessive quantities by the escaping gases into the gas flues.

Various processes have been introduced for this purpose, such as briquetting, nodulising and sintering, each of which yields a satisfactory product for use in the furnace. Sintering, the more recent process, has grown rapidly in favor, owing to its lower production costs and the large range of materials which may be treated by it, including blast furnace flue dust. The recovery of this dust alone in some cases warrants the installation of the process, particularly as, in addition to the iron ore recovered, the dust usually carries such an excess of fuel over what is required for its own treatment that a considerable proportion of other fine ore, without fuel, may be mixed and sintered with it. By these processes, and particularly sintering, many ores which in their natural state are unsuitable for use in the furnace, either owing to their mechanical condition or high sulphur content, or both, may be rendered suitable.

The Flux (Limestone or Dolomite)

Of the solid materials the flux, being easily acted upon by the heat and chemical reactions, and usually forming a small proportion of the mixture, is of less importance in connection with the question of preparation of materials. It is of sufficient importance, however, to receive consideration, as its mechanical condition has a definite bearing both upon distribution and rapidity of action in their bearing on economy. Although the effect is less in degree, it is the same in principle as in the case of the ore, and for similar reasons the flux should be broken to as nearly as practicable uniform size. In practice it has been found sufficient to break it to sizes not exceeding 4 or 6 in., or such as would pass through a 4-in. or 6-in. ring, although there is no disadvantage in breaking it to even smaller sizes. The author has had personal experience with large blast furnaces using oyster shells alone as flux over a considerable period, with perfectly satisfactory results, except that there was added to the waste gases a further objectionable feature to their usual asphyxiating qualities, their bad odor.

Blast

The only remaining raw material essentially used in blast furnace operation is the air which supplies the oxygen necessary for the combustion of the fuel. There is little to be said with regard to the blast under the heading of preparation of materials, that is, in its bearing upon modern furnace practice as distinguished from practice which is not "modern," except that the usual custom in the latter is to take the air as we find

it, although not always in all its purity. Too little attention is usually paid to this point.

Natural air in its purest state has its detrimental constituents, but as a rule little attempt is made to draw the supply for the blowing engines even as pure as it occurs. The proximity of boilers and free exhaust auxiliary machinery, and various sources of evaporation, too often charge the air near blast engine houses with quantities of moisture much in excess of that in natural air "in its purest state." In modern practice practically all exhaust steam is condensed, and a large proportion of the auxiliary machinery is electrically driven. There is therefore little, if any, opportunity for extraneous moisture to enter the blast engines with natural air. This is a feature of considerable importance, and has an appreciable bearing upon the economy of modern practice.

Although, in view of its lack of more general adoption, it has no direct bearing upon the subject of this paper, there is a treatment to which natural air may be subjected for its improvement for furnace purposes, which comes logically under the heading of preparation of materials. This is the question of dry blast or, to be more exact, the treatment of natural air for reducing its hygroscopic moisture to a uniform and low content—a treatment first introduced and practically demonstrated by James Gayley in 1904.

There has been a great deal of discussion and even contention (mainly theoretical) as to the merits of this process. At the time of its introduction it caused a great stir in iron producing centers, and during the following years a considerable number of plants were installed for its use, in the United States more particularly, and in Europe. Some of these installations are still used continuously, and some intermittently, in the United States; that is, they are used in the summer months when the moisture content of the air is high, and discontinued in the winter months when the moisture is naturally low. In other cases their use has been entirely discontinued.

There is, however, practically unanimous agreement among those who have used "dry blast" that its use does improve blast furnace results, although opinions differ as to the degree of the economy. The author has had an opportunity during the past eighteen months of discussing this matter with representative American furnace operators, particularly as to the reasons why the process has not been more generally adopted and its use continued more generally where plants have been installed. The explanation given is that the benefits obtainable from dry blast have been superseded by the great advance in blast furnace results brought about in recent years by improvements in furnace design, and the altered practice following those improvements. In other words, it has been possible to obtain in other ways advantages equal to those derivable from dry blast under the older practice. I believe that attitude to be a mistaken one and that, if every advantage which can be derived from dry blast is provided for, further improved results are obtainable in addition to those already had by the means above referred to.

There is one important feature in connection with the use of dry blast which seems to have been missed by those who have used and abandoned it, either partially or wholly, a feature which, in all probability, explains the attitude adopted toward it in the United States in conjunction with later American practice, and possibly elsewhere. This is the important factor of blast temperature. It is probably general experience (although there may be isolated cases to the contrary) that with natural air there is an upper limit to the temperature of blast which can be used with satisfactory and smooth working for any particular furnace. Any considerable increase beyond this limit causes "stickiness," "hanging" and irregular movement of the materials in the furnace. American blast furnacemen say that this is the case even with furnaces of the latest design, and a particular case was cited at one of the most modern plants in America, where very high temperatures of blast were tried, with results as above mentioned. The blast temperatures generally used range from 1150 to 1250 deg. Fahr., while with

clean gas and modern stove design (and sufficient stove capacity) temperatures as high as 1500 to 1600 deg. Fahr. are obtainable.

Were it possible to make satisfactory use of this additional heat in the blast the economical advantage which could be derived need hardly be emphasized and any practicable means which would render this possible would confer a very important boon upon the iron producing industry. The author's experience is that such a means is available in dry blast, and that it is this further advantage of dry blast added to those which are already conceded it which would, if taken advantage of, settle the doubts of those who are still undecided, and convert those who have already condemned it.

(To be concluded)

Egyptians to Learn American Manufacturing Methods

WASHINGTON, Nov. 4.—Ten Egyptian students, graduates of the engineering and polytechnic schools of Egypt, sent to America by the Khedive's government to learn American manufacturing methods, arrived last week in Washington and have been placed by the Department of Commerce in automobile and other factories where they will for two years work as actual employees, with the purpose of carrying back to the land of the pyramids the industrial and technical knowledge and skill of the Americans.

Their coming was inspired and arranged by Lester Maynard, American Consul at Alexandria, who carried on the negotiations with the Egyptian government. The Egyptian government pays all the expenses of the mission.

The railroad and telephone students were placed by the division of transportation and communications of the department, the marine engineer and the student of Diesel and internal combustion engines by the division of industrial machinery, and the six prospective automobile engineers by the automotive division.

1921 Manufacture of Tin Plate

Figures of the Census Bureau show a considerable falling off between 1919 and 1921 in the activity of the plants making tin plate andterne plate. The figures for 1921 are based upon returns from 32 establishments (exclusive of retinning plants) with products valued at \$99,128,800. This was a decrease of 45.5 per cent from the value of the 1919 product. Part of this decrease, however, is due to a lower price per lb., for the decrease in tonnage of output was only 31.4 per cent for tin plate and 30 per cent forterne plate. The unit value per lb. was given as 6.94c. in 1919 and 5.53c. in 1921. The table shows details of the report.

	1921	1919	Per Cent of Decrease
Total value of products ...	\$99,128,800	\$181,789,200	45.5
Tin plate:			
Pounds	1,638,373,000	2,388,867,000	31.4
Value	\$90,531,000	\$165,846,100	45.4
Coke—			
Pounds	1,605,958,000	2,352,317,000	31.7
Value	\$88,263,200	\$162,762,100	45.8
Charcoal—			
Pounds	32,415,000	36,550,000	11.3
Value	\$2,267,800	\$3,084,000	26.5
Terne plate:			
Pounds	87,408,000	124,920,000	30.0
Value	\$5,650,500	\$8,296,600	31.9
Other sheets (long ternes):			
Pounds	9,864,800	50,860,000	80.6
Value	\$580,400	\$3,054,900	81.0
All other products, including plates redipped, goods retinned, and custom work and repairing	\$2,366,965	\$4,591,600	48.5

Fusibility of ash from coals of the United States is the subject of one of the new publications of the Bureau of Mines, being bulletin 209, by W. A. Selvig and A. C. Fielder. A limited number of this publication is available and requests should be made to the Director of the Bureau of Mines, Washington.

JAPANESE STOCKS STILL LARGE

Stocks Decline But Still Heavy—Rail Inquiry Coming—New England Interest in Foreign Iron

NEW YORK, Nov. 7.—Dullness continues in export with the Japanese market quiet both in governmental and private purchasing. A few small inquiries are reported from South American sources. Not only are prices low in Japan for sales of material out of stock, but stocks are estimated at as high as 170,000 tons of all kinds of material, exclusive of the Government Steel works stock, stated to total 70,000 tons. Large as this figure is, it represents a considerable decline from the estimated total of 350,000 tons held at the high point of the depression. At present, the stock on hand of light gage black sheets is estimated by the representative of one large steel exporting interest in this country at about 50,000 tons. The estimated consumption per month of this material in Japan is 6000 to 7000 tons. This representative, who recently arrived in New York, states that the docks and storage facilities at the ports in Japan are now quite normal in appearance, compared with the congestion that prevailed for many months. A fair resumption of black sheet buying in the spring is rather generally looked forward to by most companies dealing with Japan. At present, buying in European markets is largely in plates, shapes, bars and sheets, upon which quotations considerably below the American price are obtained.

While low prices have been received from European sellers of iron and steel by the Japanese, there is some dissatisfaction over the delayed deliveries which have ensued in many cases. A notable instance is that of the South Manchuria Railway Co., which, prior to its latest rail purchase, placed in the United States, awarded tonnage to a German mill. Although the order was placed early this year, it is stated that the rails have not yet been received. It is reported that the Imperial Government Railways is about to issue another rail tender, which will probably total about 5000 tons. An inquiry for structural material now current from a Japanese source calls for 4000 tons.

With the general tone of the export market quiet, some export houses are again interesting themselves in attempting to import European material, which it is claimed can be profitably done in some instances. The great obstacle to successful imports, however, are the delayed deliveries. Although foreign pig-iron is said to be obtainable for November and December delivery, on finished products, British and Continental mills are quoting nothing earlier than first quarter of next year. A slightly increased interest is noted in foreign foundry iron among New England foundries. One importer, who has been bringing in small lots from time to time, reports inquiries on his books totaling 2500 tons, but in the large majority of cases a price not to exceed \$27 per ton duty paid on Scotch foundry iron, seems to be expected. At the present British market this is \$1.50 to \$2 per ton too low a basis on which to do business.

CANADIAN CONDITIONS

Steady Improvement Noted, But Pig Iron Production Still Light

TORONTO, Nov. 6.—The steady improvement in industrial activities that has made its appearance since the settlement of the coal strike in the United States has had a stimulating effect on the demand for practically all lines of iron and steel commodities. Both steel plants and foundries throughout Ontario and Quebec are operating on a more active scale than was possible six months ago and the outlook for the future is much more promising than in the earlier months of the year. In such lines as bars and sheets, mills are booked up for about six weeks and there is little or none of these commodities available for spot delivery from Canadian producers. A shortage of cars for transportation purposes is having a detrimental effect on operations in some quarters as shipment of raw materials to plants is being held up as a consequence. As a result of the difficulty in securing raw materials, the Baldwin Canadian Steel Corporation, Toronto, Ont., closed down its plant about eight weeks ago and as to when operations will be resumed is a matter of conjecture.

Pig Iron Market

The situation which developed in the Canadian pig iron market during the coal strike and transportation difficulties is now showing considerable improvement. Producers, however, are still operating only in a limited way and at the present time only one concern is carrying on a progressive sales campaign in foundry and malleable iron. Shipments of English and Scotch iron are making their appearance in the Ontario market in fairly large tonnages and consequently no shortage of iron is expected. Out of a total of 20 furnaces in Canada, only four are in operation at the present time. Of these one is being operated by the Algoma Steel Corporation, Sault Ste. Marie, Ont., on foundry; one by the Steel Co. of Canada, Hamilton, Ont., on basic and two by the Dominion Steel Corporation, Sydney, N. S., one on basic and one on foundry. Melters are showing but little concern regarding iron for future use and the greater part of the present activity is that regarding the demand on spot account, which ranges from 100 to 200 tons to a customer. During the past three weeks, Canadian producers reduced pig iron prices \$3 per ton, and melters are expecting still greater reductions before the end of the year. Pig iron prices are now hold-

ing as follows: No. 1 and malleable, \$36.30; No. 2, \$35.30, Toronto, Ont. Montreal prices are: No. 1 and malleable, \$38.70 and No. 2, \$37.70. British iron, namely, Carron and Summerlee, are quoted at \$33 to \$35 per ton, dock, Montreal.

Finished Materials

Local mill representatives report active demand for various lines of iron and steel. The brisk activities that have prevailed in the building trades have had a good effect on the demand for shapes, beams and reinforcing bars, and together with requirements of 3000 tons of reinforcing bars for the Welland Canal, have resulted in a strong movement in these commodities for some time past. The Toronto mill price on shapes is strong at 2.40c. Plates are moving freely and inquiries are making their appearance from shipbuilders and repair yards as well as from boiler and tank makers who are reporting active operations at the present time. Plates are quoted at 2.30c., Toronto. The demand for bars has been strong throughout the past two or three months and as up to a very short time ago only limited shipments were arriving from American producers, Canadian mills were closing a very considerable portion of the bars required for consumption in the Dominion. To-day both jobbers and large consumers are entering the market for bars for spot and future delivery, but mills have little to offer inside of six weeks' time. Bars are quoted at 2.60c., Toronto. A good demand exists for black and galvanized sheets, and the mills at Hamilton are said to be operating at full time in order to keep up with the business on their books. No. 28 gage black sheets are quoted at 3.35c., and 28 gage galvanized at 4.60c., Toronto.

Youngstown as an Industrial Center

In a 40-page booklet, 8 x 11 in., the Diversified Industries Committee of the Youngstown Chamber of Commerce invites industries to locate in Youngstown. Attention is centered upon the industrial phases of Youngstown's development, without reference to historical facts. About 250 different lines of manufacture are listed as being comprised within Youngstown's group and illustrations are given of a large and diversified group of these industries.

It is of interest to note that the booklet gives the 1920 pig iron production of the Youngstown district, from 53 blast furnaces, as 5,617,057 tons. This may be compared with 8,034,000 tons, also in 1920, from the entire United Kingdom of Great Britain.

ADVANCING GERMAN PRICES

Large Company Earnings Fictitious—Domestic Demand Strong But Foreign Buying Decreases

BERLIN, GERMANY, Oct. 19.—The great rise in iron and steel prices which took place in August almost ceased in September, through a temporary improvement in mark exchange; but in October it was renewed, owing to the dollars having passed the 3000 mark limit. This affected all metals. The minerals-group index of the *Frankfurter Zeitung* showed for August a rise from 18,355 to 42,648, and in September a movement from 42,648 to 54,905. The new increases this month are moderate. Pig iron prices are as follows, in marks per metric ton:

	Oct. 16	Oct. 11
Hematite	39,921	38,099
Foundry iron, No. 1	35,173	32,696
Foundry iron, No. 3	35,103	32,626
Siegerland steel-iron	33,499	31,497
Spiegeleisen	36,582	34,494

Steel Syndicate prices per metric ton on semi-finished and finished steels are as follows:

	Oct. 18	Oct. 11
Ingots	59,470	57,640
Blooms	55,650	63,630
Billets	68,400	66,290
Slabs	76,360	68,190
Construction forms	80,250	77,780
Bars	81,200	78,700
Wire rods	87,210	84,520
Sheets:		
Heavy	91,270	88,460
Medium	103,350	100,170
Light	113,450	109,960
Under 1 mm.	120,680	116,960

Steel Prices Relatively High

These rates vary from about 700 fold upward above pre-war rates; and therefore correspond to the external currency depreciation; but they are considerably higher than they would be based upon the internal currency depreciation. In other words, domestic steel prices are relatively dearer than domestic prices of most other commodities. The cost of foreign ore, and of coal, on which there is a tax of 40 per cent, sufficiently explains the disparity.

The iron and steel markets are still extraordinarily active. Privy Councillor Kloeckner, the head of the Lorraine company, says that while shortage of working capital threatens trouble, the general outlook is promising: "Foreign countries," he says, "still show willingness to buy, the overseas demand is great, England always appears among the givers of orders, and in general we have more work than we can do."

The last official labor report shows an increase from 6 to 7 per thousand in unemployed and on this ground the *Labor Gazette* prophesies a bad winter, but such unfavorable prophecies are made every fall. The *Frankfurter Zeitung* reports that the worst fears were held concerning the Frankfurt Fair, which was largely a metal and machinery exposition, but that the fears proved entirely baseless. Exhibitors and buyers appeared in large numbers.

The steel industry, however, is wholly under the influence of the currency crisis. Shortage of capital is great, and there is general uncertainty. Such uncertainty always prevails as long as the mark exchange is violently moving, and disappears during the intervening periods of relative stability. The shortage of coal and coke continues. Recent imports of English coal averaged 1,100,000 tons a month, costing over 11,000,000,000 paper marks monthly. No real loss is caused, as the foreign coal is used exclusively in industry, and is therefore an instrument for producing much more valuable goods. In September home coal rose by 2592 m. per metric ton to 4105 m. and a new heavy increase is due.

Importing to Export in Manufactured Condition

The domestic demand for heavy iron and steel, semi-finished materials, and finished metal products is unabated, but latest reports show that while foreign inquiries still come in abundantly, there is a slight de-

cline in the volume of orders actually booked. Some metal concerns have been accepting foreign orders at prices that were too low. The increasing imports of heavy iron and steel are a cause of complaint in the trade press; but here again a relatively cheap material, which under present conditions foreigners cannot convert into finished products without loss, is so converted by Germany, and this is wholly to the national advantage.

In August, the last month reported, Germany imported 24,989 tons of pig iron, and exported only 6851 tons; and from January to August inclusive imports of pig iron totaled 173,042 tons and exports only 195,749 tons. Imports of ferroalloys exceed the exports; the imports of scrap from January to August were 381,856 tons against exports of 27,719 tons; and the imports of bars, girders and hoops were 446,121 tons against exports of 330,652 tons. Against this, Germany in the same eight months exported 27,665 tons of tools against 488 tons imports; 308,145 tons of machines against 7151 tons; 221,798 tons of ties, rails, etc., against 68,057 tons imported; 25,596 tons of farm machinery against 837 tons imported, and 27,009 tons of domestic iron and steel articles against 3285 tons imported. These figures tend to show that the apprehension that the Versailles Treaty would compel Germany to do Europe's roughest and worst-paid work (producing coal, pig iron, etc.) are unfounded, and that the policy proclaimed two years ago by Hugo Stinnes, when he established the Rhine Elbe Union, has become a fact. This policy was to keep at home metal and other raw materials, and to import if necessary more raw materials, in order that the output of high-priced finished products might be increased.

The Stahlwerk Becker is reported to be negotiating with a Luxemburg-Belgian-French group for the transfer of a large, if not a majority, interest to the group. The Phoenix company has decided to increase its capital from 275,000,000 to 300,000,000 marks. Increased profits and higher dividends are reported by nearly all steel companies, dividends ranging from 20 to 100 per cent, but the increases are fictitious, being gained in ever more depreciated marks. When allowance is made in some cases for considerable increases of capital, the gold dividends are much lower than the dividends of the preceding year.

This is the general course of Germany's steel industry. If a company's output is as high as before the war the paper mark profits should theoretically be several hundred fold higher than in 1914, the mark being internally depreciated about 500 fold. The real increases, however, are much smaller. The reason for this is that the main burden of taxation falls on the capitalist. The industrial worker, having always lived at near the existence minimum, cannot have his real wage materially reduced. From the national standpoint, this is a great advantage. Employment is provided if a great industrial concern only just pays its way or reaps small profits; while the ruined stockholders and bondholders are driven, as the *Frankfurter Zeitung* points out, into the ranks of the producers, and the result of the process is to increase the national wealth.

New England Plant Activities

About 125 union molders at the Saco Lowell Shops, Biddeford, Me., are on strike for a 20 per cent increase in wages. Less than 50 non-union men have remained at work. The strikers had been getting \$5.20 per day.

The Pratt & Whitney Mfg. Co., Hartford, Conn., machinery and machine tools, has increased its running time to 50 hours per week. The company is employing about 1000 skilled workers or approximately 200 more than a year ago.

Cutlery and hardware manufacturers of New Britain, Conn., are running various departments overtime in an effort to keep up with incoming orders.

The most active foundries in New England to-day are those engaged on stove castings. A Taunton, Mass., stove maker is 5000 gas stoves behind orders, while a Watertown, Mass., concern is melting more iron than ever before in its history.

"FISHING EXPEDITIONS"

Court Decision May Make Federal Trade Commission More Cautious

WASHINGTON, Nov. 7.—Representatives of various trade associations in Washington believe that the recent decision of Judge Manton of the United States District Court of the southern district of New York, in which he condemned "fishing expeditions" will have a salutary effect upon the methods of the Federal Trade Commission in conducting its investigation and price inquiries. It has been the custom of the commission agent to pry into private files of corporations and individuals for the purpose of finding out whether they contained any evidence upon which charges of law violations could be based. Nothing, it is declared, was safe from the agents of the Government in their search for data. It is expected in some sources that the latest decision in the case of the Federal Trade Commission against the Lorillard company will restrain officials of the commission and make them modify their practice.

The Lorillard case is held to be an example of the methods used by the commission and an instance where

it grossly exceeded its authority. According to the evidence in this case, the commission demanded all correspondence to and from the jobber customers of the Lorillard company for a period of a full year without any charge or complaint having been made against the company. The Manton decision revives interest in the fourth amendment to the Constitution, which makes the right of the people secure against unreasonable searches and seizures. It is significant to note that Judge Manton in his decision, said: "It is now well established that a corporation is entitled to invoke the guarantee of the fourth amendment against unreasonable searches and seizures in as full measure as would a person or partnership."

It is believed that certain members of the commission will insist that an appeal be taken to the United States Supreme Court to define the authority of the commission. As the matter now stands, the District Court has ruled that the Federal Trade Commission lacks lawful authority to go through the private papers of corporations or persons on "fishing expeditions," but that it may demand access to specified papers or records, for the purpose of securing specific evidence relating to a particular complaint, or other specific purpose authorized by law.

Expansion Plans of Ford Motor Co. of Canada

The Ford Motor Co. of Canada has definitely entered upon its expansion project announced some time ago, when the company was reported to have acquired extensive real estate holdings adjoining the present site of its plant at Ford City, Ont.

According to Walter R. Campbell, vice-president and treasurer of the company, the project includes the erection of docks and storage facilities on the river front, a power plant and machine shop which will, when completed, enable the Canadian Ford company to increase its output 60 to 100 per cent.

The power plant and pumping station will be large enough to supply the entire manufacturing plant with power and water for many years to come. All electrical wiring and piping for water, gas and heat for the various buildings will be carried through tunnels.

The first development will be the large machine shop to be erected on the 50 acre plot between the Grand Trunk right-of-way and the Essex terminal. The building will be one story, steel, 578 x 1080 ft. long. With this additional space the company will be able to increase its production more than 60 per cent.

On Oct. 25 an order for 2800 direct current motors was placed. Vice-president Campbell estimates that by May 1, 1923, the new machine shop will be ready to enter upon the new production schedule which has been set at 75,000 cars for the year. Under present conditions, the output for the fiscal year ending July 31 has been 45,000 and for the calendar year about 50,000 cars.

Increase in Employment in Steel Industry

WASHINGTON, Nov. 7.—The iron and steel industry showed a larger increase in the number of employees in October than any other industry, according to the report of the United States Employment Service, Department of Labor. The report records an increase in 12 of the 14 major industrial groups, representing 1428 concerns. On Oct. 31 these industries had 52,868 more employees on their payrolls than those carried on Sept. 30. Iron and steel revealed an increase of 19,348, according to the report. Increases in other industries, included railroad repair shop, 6700; stone, clay and glass, 1509; chemicals and allied product, 2946; vehicles for land transportation, 8272; lumber and its manufacture, 752; metal and metal products, other than iron and steel, 2444; miscellaneous industries, 4478; paper and printing, 912; leather and its finished products, 899; textiles and their products, 4223; food and kindred products, 1370. Decreases were shown in tobacco and liquor and beverages, employment in the former industry declining 1255, while in the case of liquor and beverages the increases were reported to be only six.

The report says "the iron and steel industry is

rapidly recovering everywhere, although a car and labor shortage seems to be holding operations and employment to a 75 per cent production."

Program of National Founders' Meeting

The program of the annual meeting of the National Founders' Association, to be held at the Hotel Astor, New York, Nov. 22 and 23, is as follows:

Wednesday Morning Session:

Reports of President William H. Barr, Commissioner A. E. McClintock and Secretary J. M. Taylor.

Report of new membership committee, H. J. Boggis, chairman.

"The Proposal to Destroy the Judicial Power" by James A. Emery, counsel National Founders' Association.

Wednesday Afternoon Session:

"The Physician in Industry" by Dr. J. J. Moorhead, New York.

"The Open Shop" by John E. Edgerton, president National Association of Manufacturers.

"The Railroad Situation" by L. F. Loree, president Delaware & Hudson Railroad.

Dinner, Wednesday Evening:

Address by Samuel Harden Church, president Carnegie Institute.

Thursday Morning Session:

"Improved Foundry Practice" by D. R. Wilson, vice-president Wilson Foundry & Machine Co.

"Apprenticeship" by William M. Taylor, Chandler & Taylor Co.

Reports of committees and election of officers.

Mahoning Valley Scrap Market

YOUNGSTOWN, Nov. 7.—There has been an appreciable decline in buying of old metals by Valley steel plants. Most of them are producing larger tonnages of scrap in the various processes of rolling down ingots into finished products, while several have large accumulations in their yards which they prefer to work off to some extent before entering the market on any extensive scale.

Heavy melting scrap is purchasable at \$21, while compressed sheets are quotable around \$20.

Extensive scrap piles in the yards of steel makers indicate that some of the leading interests are well fortified in this respect. One company has a large tonnage of old rails ready for melting as its needs require.

Plans of New Companies

The Chicago Auto Parts Co., 3732-6 South Wallace Street, Chicago, was recently incorporated to manufacture automobile equipment, but will not do any manufacturing for a time. It has leased buildings and will handle under contract a line of replacement fenders manufactured by the Fostoria Pressed Steel Co., Fostoria, Ohio. It plans to handle any product of importance in the automotive sheet metal line, including headlamps, running board enclosures, splash shields, radiator shells, etc.

The Newark Screen Corporation, Brooklyn, was recently incorporated with a capital of \$10,000 to manufacture screens and other wire products. T. F. Twyford, 44 Beaver Street, New York, is corporate representative.

John T. Hill & Co., Inc., 1318 Continental Building, Baltimore, Md., has been organized recently by John T. Hill, formerly president of R. C. Hoffman & Co., Inc., and is receiving inquiries for relaying rails, scrap, track material, black and galvanized sheets, reinforcing material and bars. The firm will also act as consulting engineers.

The Paul Mfg. Co., 5243 Western Avenue, Detroit, has been incorporated with a capital of \$30,000, to operate a general machine works and to manufacture machinery. Its immediate activities will be confined practically to the manufacture of washing machines, since it has purchased the business of the James Washing Machine Co. The present locations is only temporary. Plans are already under way for a modern factory of 100,000 sq. ft. capacity which will be completed some time next spring. The officers of the company are: Richard R. Paul, president; Lorin R. Runkle, vice-president; Raymond M. Merline, secretary and treasurer.

The Martin Demountable Rim Co., Flint, Mich., has been incorporated with a capital of \$100,000, to manufacture metal rims for automobile wheels. The incorporators are: Walter S. Martin, Wage H. Horn, and Andrew W. Begin, 1325 Avenue B, Flint.

The Met-All Mfg. Co., Detroit, has been organized to take over the business of the Tube Products Co., 2699 Guoin Street, Detroit, and was recently incorporated with a capital of \$500,000. Its products will include steel tubing and metal ladders. The officers of the company are: C. S. Jacobs, president; F. L. Jacobs, treasurer; and C. R. Robinson, secretary.

The Universal Body Corporation, 230 East Ohio Street, Chicago, has been incorporated with a capital of \$50,000 to manufacture automobile bodies and parts. Under the present plans manufacturing will be confined to bodies of the closed type. Within the next three months wood-working and metal-working machinery will probably be needed. There are still some contracts to be awarded for body equipment. In addition to its plant at Thirty-ninth Street and State Streets, the company has leased a building of 24,000 sq. ft. J. L. Gefer is president and W. H. Heggem is secretary.

The Paragon Disk Wheel Co., 254 Hawthorne Avenue, Portland, Ore., has been incorporated with a capital of \$100,000 to manufacture metal wheels for automotive service. During the last two years the company manufactured Paragon steel disk wheels under the name Wilkinson Brothers. The incorporators are: Thomas Wilkinson, general manager; William Wilkinson and George N. Schell, all of Portland.

The Hillman-Ayres Mfg. Co., P. O. Box No. 2, Kansas City, Mo., has been organized to manufacture machine tools and other machinery, but for the present will confine its activities to Kewanee-Laclede oil business for hot air furnaces, power boilers, forging and annealing furnaces, etc. The company is headed by J. P. and A. A. Hillman and W. B. Laughlin, all of Kansas City.

The Houghton Mfg. Co., Chicago, was recently incorporated and will manufacture tire pumps and other automotive accessories. Initial operations have been started on a limited scale. H. T. Houghton is president and treasurer.

The National Motor Castings Co., South Haven, Mich., has been incorporated with a capital of \$250,000 to manufacture iron, steel and other metal castings. The company does a general foundry business, but specializes in motor castings. Its present capacity is about 1300 tons per month. This company was formerly chartered in Delaware. R. B. Campbell is president and he, with F. H. Gallagher and G. H. Wisting, all of South Haven, are the incorporators.

The Sterling Cutlery Corporation, 20 Hamilton Street, Paterson, N. J., which was recently incorporated, will manufacture electric water heaters. E. V. Evans heads the com-

Trade Changes

The Ellwood Steel Corporation, Ellwood City, Pa., has changed its name to the Ellwood City Nail Co., this name being more definitive of the company's activities, which are chiefly in the production of wire nails. The company, which was incorporated earlier in the year under Pennsylvania laws with a capital of \$5,000, recently increased the capital to \$250,000. Officers of the company are: President, George E. Blythe; vice-president, John E. Tyler; secretary, Ira E. Bixler; treasurer, August Miller; directors, J. A. Gelbach, J. W. Offutt and Walter Scott.

The Consolidated Tool Works, Inc., 296 Broadway, New York, has made the following recent additions to its sales force: William H. Thompson, formerly with the Union Hardware Co., Torrington, Conn., is representative in New York City; Howard A. Postley, formerly with the Knickerbocker Mfg. Co., Belleville, N. J., is representative in New England territory; William L. Rubin, formerly with the Jacobs Scale Co., New York, will cover Pennsylvania, New York, Maryland, District of Columbia, and parts of West Virginia and Ohio, and Charles Alburtus, formerly with the American Safety Razor Co., Brooklyn, N. Y., will act as representative in New Jersey.

The Dominion Asbestos & Rubber Corporation has removed its offices from 154 Nassau Street to 1780 Broadway, New York. It has recently added to its line the Dominion brake block for use on heavy hoisting apparatus.

The Boston office of the Carnegie Steel Co. has been moved from the second floor, 200 Devonshire St., to the seventh floor.

C. M. Lovsted & Co., malleable and steel car castings, frogs and switches, has removed its offices and warehouse at Seattle, Wash., from 316 to 2212-16 First Avenue South.

Frederick Franz, who for the past four years has been chief engineer of the Terminal Engineering Co., manufacturer of trucks designed for combined indoor and other service for railroads, shipping and industrial plants, has established an engineering office at 27 Warren St., New York, for the purpose of solving special problems of engineering relating to labor saving machinery.

The Firth-Sterling Steel Co., 310-14 Hudson St., New York, announces the addition to its line of Globe polished drill rods drawn by the Globe Wire Co., Sharpsburg, Pa. These rods are made from steel produced by the Firth-Sterling company. Complete stocks are now carried in its New York, Boston and Philadelphia warehouses.

The Cleveland office of the Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, has been removed to 1204-5 Citizens Building.

The Angle Steel Stool Co., Otsego, Mich., has removed to a recently completed factory at Plainwell, Mich., where increased facilities will be provided. C. E. Pipp is president and general manager.

A reorganization of the sales and operating forces of the Atlas Steel Corporation, Dunkirk, N. Y., is being effected. Louis J. Campbell, formerly president of the Electric Alloy Steel Co., is to be chairman of the board, and Arthur H. Hunter, formerly president Atlas Crucible Steel Co., will be president.

Joseph Beal & Co., 465 Atlantic Avenue, Boston, have been made representative agents for the South Bend Lathe Works, South Bend, Ind., in a large section of eastern New England.

John S. Burdick, formerly vice-president and general manager Buffalo Body Corporation, has incorporated a company to be known as the Burdick-Atkinson Corporation, 33 Scott Street, Hamburg, N. Y.

The Edward G. Budd Mfg. Co., sheet metal worker, Philadelphia, is preparing for an authorized increase of capital in the near future, the purpose of which is to take care of plant expansions. It has purchased the Shoch Building, which it has occupied for some time; also the property of the Simmons Co. from which it will derive 150,000 sq. ft. of additional floor space. A contract has been awarded for the completion of the Simmons building.

The Southern Dry Dock & Shipbuilding Co., Orange, Tex., has arranged for a change of name to the Orange Car & Steel Co. Operations in the future will be concentrated on steel railroad car construction and repairs.

After Federal Judge Cooper signed the order last week confirming the sale of the Syracuse plant of the Willys Corporation to W. C. Durant, it was learned that this property will be turned over to the T. W. Warner Corporation, Toledo, Ohio.

Machinery Markets and News of the Works

SLOWLY IMPROVING

National Tube Company's Award the Leading Activity

Buying from Miscellaneous Sources Better—Railroad and Automotive Purchases Fall Off

A slight improvement is noted generally, but more especially in the cities in the central section. Steady increase is reported from Cincinnati, where the early October rate of buying is expected to be maintained if not increased during the present month; planers seem to have been particularly active during the week. In Chicago business from miscellaneous sources has been better, several fair sized purchases being noted. Cleveland reports improvement with business from scattered sources predominating, and turret lathe manufacturers booking orders for small machines from the brass industry. Very little expansion of sales is reported from New England, although prospective purchasers are more numerous. New York reports a dearth of inquiry and sales. Used machinery in some districts is not in competition with new tools to the extent that formerly prevailed.

The outstanding activity of the week was the award of 41 cranes for its new works at Gary, Ind., and 12

heavy machine tools by the National Tube Co. It is estimated that the complete order involved an expenditure of more than \$500,000. A large list is being figured on for equipment to go direct to the Gary plant.

In the automotive field the trade is looking for considerable business from the Durant interest for its new plant at Flint, Mich. The actual requirements have not as yet been revealed. Except for the placing of a few single machines automobile manufacturers have not been in the market.

Railroad buying has fallen off. The Chicago & Northwestern has bought five machines against its list and a purchase of two machines by the New York Central is noted. The Missouri-Kansas-Texas placed three planers and is buying other equipment. Purchases on the list E-1566 of the Pittsburgh & Lake Erie are expected within two weeks. The Chicago, Burlington & Quincy is expected to close the remainder of its list soon.

Recent inquiries include the Lombard Governor Co., Ashland, Mass., for a tool room lathe, boring mill and some miscellaneous equipment. The General Electric Co. at Lynn, has issued a small list and has inquired for presses and other equipment for its Pittsfield and Bridgeport plants.

Several new crane inquiries are noted.

New York

NEW YORK, NOV. 7.

THERE has been a dearth of machine-tool inquiry and sales in the past week. Eastern machine-tool companies find that orders are coming more freely from Chicago, Cleveland and other cities in the central section of the country than from the East. While buying in the New York territory has shown a steady increase in the past few months, the volume of business done in October showing a gain over that of September, there is still a great deal of room for improvement. The Baldwin Locomotive Works has bought a Niles planer, 130 x 84 in. x 20 ft.

A few new inquiries for overhead traveling cranes are current and a number of old ones are still pending. Slight activity is noted in the hand power crane field and in sales to dealers of chain blocks. Sellers of locomotive cranes report a fair number of inquiries, but few purchases in this district. Among recent inquiries for electric traveling cranes is one from the General Electric Co., calling for bids on a 60-ton, 60-ft. span, 4-motor overhead traveling crane for Pittsfield, Mass. The crane is to be installed to replace two 30-ton overhead cranes. The inquiry of the U. G. I. Contracting Co., Philadelphia, for a 100-ton overhead traveling crane, which has been pending for some time, has been revised and now calls for a 50-ton, 52-ft. span, 4-motor, overhead traveling crane. Barnet Weinstein, 53 Boerum Street, Brooklyn, N. Y., is reported to be in the market for a small hand-power crane. Russell, Burdall & Ward, Portchester, N. Y., are receiving bids on monorail hoists.

Among recent purchasers are:

Sanderson & Porter, 52 William Street, New York, consulting engineers, a 110-ton electric traveling crane from the Cleveland Crane & Engineering Co.

American Abrasive Metals Co., 50 Church Street, New York, a 2-ton, 45-ft. span, 3-motor overhead traveling crane from the Shepard Electric Crane & Hoist Co.

McGowan & Arnott, Brooklyn, N. Y., a 5-ton, 26-ft. span, 3-motor, overhead traveling crane from the Shepard Electric Crane & Hoist Co.

Duquesne Slag Products Co., Diamond Bank Building, Pittsburgh, a 20-ton, 50-ft. boom locomotive crane and a 15-ton, rebuilt industrial locomotive crane from the Industrial Works.

Dwight P. Robinson, Inc., 61 Broadway, New York, a 40-ton, 80-ft. lattice boom, with 20-ft. and 10-ft. removable sections, for use in Alabama, from the Industrial Works.

New York Central & Hudson River Railroad, New York, a 5-ton electric hoist from the Shepard Electric Crane & Hoist Co.

Lisenby Mfg. Co., Fresno, Cal., a 1-ton, 37-ft. span, 3-motor, overhead traveling crane from the Shepard Electric Crane & Hoist Co.

Edward L. Soule, San Francisco, Cal., a 5-ton, cage control, mono-rail hoist from the Shepard Electric Crane & Hoist Co.

Chattanooga Stamping & Enameling Co., Chattanooga, Tenn., a 1-ton, 27-ft. span, overhead traveling crane, from the Shepard Electric Crane & Hoist Co.

American Agricultural Chemical Co., 2 Rector Street, New York, a 3-ton electric hoist for Everett, Mass., from an unnamed manufacturer.

Phillip T. King, 30 Church Street, New York, dealer, has purchased a 30-ton Browning, two 20-ton Brownhoist and one 15-ton industrial locomotive cranes, used, from the Pusey & Jones Shipbuilding Co., Gloucester City, N. J.

Rome Mfg. Co., Rome, N. Y., a 35-ton, 35-ft. span, 5-motor, double trolley, overhead traveling crane from the Niles-Bement-Pond Co.

The American Can Co., 120 Broadway, New York, has plans for a new four-story factory at Boston and Hudson Streets, Baltimore, 90 x 160 ft., to cost approximately \$350,000, including machinery. C. J. Preis, company address, is engineer.

The National Biscuit Co., Tenth Avenue and Fifteenth Street, New York, will commence the erection of a three-story service building and repair works, 20 x 70 ft., at 407-11 West Sixteenth Street, for company automobiles and trucks, estimated to cost \$60,000.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until Nov. 21 for 90 oil coolers for the Brooklyn Navy Yard.

A. G. Schoonmaker, 25 Church Street, New York, head of A. G. Schoonmaker & Sons, machinists, has inquiries out for a two-cylinder air compressor, capacity about 140 cu. ft.

The Standard Gas Light Co., 130 East Fifteenth Street, New York, will erect a new service building and machine repair works, 98 x 200 ft., for automobiles and trucks, at 405-15 East Thirty-second Street, to cost \$65,000.

The Erie Railroad Co., 50 Church Street, New York, has arranged for the consolidation of its four operating districts into three divisions, abolishing that at Hornell, N. Y. With the exception of the repair shops at Meadville, Pa., and Marion, Ohio, all locomotive and car shops will be under direct company supervision and no outside contracts will be operative.

The Miller Rubber Co., 256 West Fifty-fifth Street, New York, manufacturer of tires and tubes, will commence the erection of an addition to its plant at Akron, Ohio, 70 x 105 ft., estimated to cost \$25,000.

A power house will be erected in connection with the new hospital on Mamaroneck Avenue, White Plains, N. Y., planned by the New York Orthopedic Hospital, Third Avenue and Twenty-third Street, New York, estimated to cost approximately \$500,000.

The Gardner Hygienic Ice Co., 915 Cypress Avenue, Brooklyn, is taking bids for a one-story service building and machine repair shop, 100 x 100 ft., estimated to cost \$50,000. Louis Berger & Co., 1652 Myrtle Avenue, Brooklyn, are architects.

The Superintendent of Lighthouses, Staten Island, will receive bids until Nov. 20 for 180 acetylene cylinders, 88 ft., 1-kw. radio transmitting set for fog signal and one extra motor-generator.

A power house, ice and refrigerating plant will be installed in the proposed terminal market to be constructed by the Department of Plant and Structures, Municipal Building, New York, at the 149th Street bridge, between 161st Street and the Harlem River, to cost in excess of \$5,000,000.

The New York Central Railroad Co., 466 Lexington Avenue, New York, C. S. White, purchasing agent, room 344, will receive bids until Nov. 16 for electric motors and controls, as set forth in serial contract No. 32—1922.

The Transit Commission, 49 Lafayette Street, New York, has foundations in progress for a third addition to the car repair shops of the Interborough Rapid Transit Co., Lenox Avenue and 147th Street, estimated to cost \$500,000.

A complete power plant, including electrical department, ice and refrigerating plants, will be installed in the new hospital to be erected by the Beth Israel Hospital, 70 Jefferson Street, New York, estimated to cost \$3,000,000. Louis A. Abramson, 46 West Forty-sixth Street, is architect.

The Falls River Co., 261 Broadway, New York, will build a one-story addition to its plant at Kent, Ohio, 165 x 210 ft., estimated to cost \$50,000.

A new one-story pumping plant will be built on Willow Avenue, Clifton, S. I., by the New York & Richmond Gas Co., Bay Street, Stapleton, S. I.

The International Petroleum Co., 120 Broadway, New York, has initial work in progress on a new refinery at the mouth of the Magdalena River, Peru, to have a daily capacity of 25,000 bbl.

The Plaza Metal Bed Co., 5 La Grange Street, Brooklyn, will make improvements and extensions in its three-story plant for general increase in manufacture.

The Standard Oil Co. of New Jersey, 26 Broadway, New York, will arrange a fund from its recent 400 per cent stock dividend allotment for extensions and improvements in refineries in different parts of the country, storage and distributing plants, etc.

The George H. Stern Lumber Co., 545 East Seventy-first Street, New York, will build a power house in connection with its new plant on property lately acquired on Sixty-ninth Street, estimated to cost \$100,000. Plans are being prepared by William H. Gompert, 117 Madison Avenue.

The McNab & Harlin Mfg. Co., 110 William Street, New York, manufacturer of iron, steel and brass pipe, etc., with plant at Paterson, N. J., has disposed of a bond issue of \$750,000, a portion of the proceeds to be used for extensions.

A power house will be installed in the new six-story and basement building, 50 x 80 ft., to be erected at 652-60 Bergen Avenue, Jersey City, N. J., by the local Y. M. C. A., 76 Montgomery Street, estimated to cost \$500,000. John F. Jackson, 1819 Broadway, New York, is architect.

Robinson & Co., Frenchtown, N. J., manufacturer of metal and wood novelties, have leased a building on Front Street, Belvidere, N. J., for a new plant.

The Thomson Machine Co., Belleville, N. J., manufacturer of bakers' machinery and parts, will dispose of its factory on Main Street, to concentrate operations at its new plant on

Cortland Street, now in course of erection, approximating 40,000 sq. ft. Considerable additional equipment will be installed.

The New Jersey Power & Light Co., Dover, N. J., has acquired the plant and property of the Hackettstown Electric Light Co., Hackettstown, N. J., and will take possession Jan. 1. Extensions and improvements are planned, including the merging with the system of the new owner.

New pumping machinery, power equipment, etc., will be installed at the waterworks plant of the Maple Shade Water Co., Maple Shade, N. J., in connection with enlargements and improvements, to cost \$50,000.

William Benke, Newark, manufacturer of automobile bodies, has purchased the one-story building, 85 x 100 ft., at 343-49 Elizabeth Avenue, for a new plant.

Ovens, power equipment, conveying machinery and other electrical and mechanical equipment will be installed in the one and two-story plant to be erected on Abingdon Avenue, Newark, N. J., by Dugan Brothers, 287 Broadway, Brooklyn, to be 150 x 167 ft. and 50 x 167 ft., respectively, estimated to cost \$200,000. Marshall N. Shoemaker, 15 Central Avenue, Newark, is architect.

The Orenstein Trunk Co., 338 Central Avenue, Newark, has leased the second floor of the building at Plane and Hackett Streets for a new manufacturing plant. Employment will be given to about 250.

C. W. Curtiss, Newark, formerly general manager Splitdorf Electrical Co., 98 Warren Street, and Carl T. Mason, previously chief engineer of the same company, have organized the Metropolitan Radio Corporation to operate a plant at 67-71 Goble Street, for the manufacture of receiving sets, head phones, jacks and other wireless apparatus. Mr. Curtiss will be president and Mr. Mason chief engineer.

Catalogs covering equipment for diamond mining, cutting and finishing are wanted by Antonio Parra, Venezuela Trading Co., 251 Broadway, New York.

New England

BOSTON, Nov. 6.

SALES of machine tools in this district the past week showed little if any expansion, yet prospective business has increased and the general outlook perhaps is more encouraging. The purchase of eight cam milling machines by a Massachusetts manufacturer constitutes the largest individual sale of new equipment. Other transactions include a 20-in. x 10-ft. lathe and a power saw, a 30-in. x 8-ft. planer, large cutting machine, disk grinder, a 20-in. used drill, 12-in. x 5-ft. tool room lathe, three used Porter-Cable lathes, an automatic screw slotter, saw and filing equipment, three special automatic machines for squaring the ends of taps, and miscellaneous new and used tools.

The Lombard Governor Co., Ashland, Mass., is in the market for a tool room lathe, boring mill and miscellaneous equipment; the General Electric Co., Lynn, has issued a small list of individual tools, but the actual purchase may be put over until 1923. It also has inquiries out for presses and other equipment for its Pittsfield and Bridgeport plants. In addition there are several new sizable inquiries of a private nature which eliminates competition, details of which are lacking. Although nothing definite has transpired, most of the New England railroads are making up their 1923 budgets, and indications strongly point to larger equipment purchases than heretofore. Several leading manufacturing interests have definitely decided to hold over until 1923 purchases of machinery.

Sales of hangers are heavier than in several months, and small chain hoists are in better demand. Vises are more active, while bookings of drills and other small tools and repair parts are holding their own. Makers of gasoline gages, automobile timers and numerous other small appliances are buying die castings on a larger scale than in any previous month this year.

The Bellevue Monumental Works, Lawrence, Mass., has awarded contract for a one and two-story shop, 40 x 53 ft., on Manchester Street.

The J. J. Walsh Co., 1540 Columbus Avenue, Roxbury, Boston, truck bodies, has awarded a contract for the erection of a one-story, 72 x 122 ft. manufacturing unit on Columbus Avenue and Center Street.

The Stanley Works, New Britain, Conn., builders' hardware, etc., has purchased about one and one-half acres of adjoining land, together with buildings and railroad sidings, for future expansion. For light manufacturing purposes it has rented two floors in a New Britain Machine Co. unit.

The Underwood Typewriter Co., Hartford, Conn., has purchased from the Johns-Pratt Co. that city, property on Capitol Avenue consisting of six main manufacturing units, containing about 92,000 sq. ft. floor space, a boiler plant and engine room. The price was approximately \$125,000. The company will utilize this additional space for manufacturing purposes as soon as the present equipment has been removed and new machinery installed.

The Union Hardware Co., Torrington, Conn., has preliminary plans for an addition and later it is proposed to build a three-story factory on Mignon Avenue, in the vicinity of the present office building.

The Eastern Massachusetts Electric Co., 201 Devonshire Street, Boston, has petitioned the Department of Public Utilities for permission to issue capital stock for \$110,000, and bonds for \$75,000, a portion of the proceeds to be used for extensions and improvements.

Rolls-Royce of America, Inc., Springfield, Mass., has disposed of a bond issue of \$2,000,000, a portion of the proceeds to be used for extensions.

A power house and electrical department will be installed in the new office building to be erected by the Aetna Life Insurance Co., 650 Main Street, Hartford, Conn., estimated to cost \$3,000,000. James G. Rogers, 367 Lexington Avenue, New York, is architect.

The National Collapsible Tube Co., 362 Carpenter Street, Providence, R. I., has completed plans for a one-story addition.

M. Strauss, Boston, operating a sheet metal works at 23 Merrimac Street, is planning for the installation of automatic shears, punch, and other equipment. Used machinery in good condition will be considered.

The Bethlehem Shipbuilding Corporation, Boston, operating the Fore River shipyard, has acquired the Simpson Patent Dry Docks, Jefferies Point, East Boston, consisting of three dry docks, plate shop, machine shop, power house and other buildings. Immediate operations are proposed. The plant will be known as the Simpson Works of the company. S. Wylie Wakeman, general manager at Fore River, will act in the same capacity here.

The Macrodil Fibre Co., Carnation Street, Woonsocket, R. I., has awarded contract to F. Pelletier, Woonsocket, for a new one-story factory, 60 x 150 ft., estimated to cost \$15,000.

Pittsburgh

PITTSBURGH, Nov. 6.

THE past week has been featured by the closing of much machine tool and equipment business which has been pending for some time. Outstanding among the awards are the 41 cranes by the National Tube Co. for its new works at Gary, Ind., and 12 heavy tools, eventually for that plant, but which will be shipped to its Lorain, Ohio, works for the manufacture of special equipment for the Gary plant. The crane business, as intimated in THE IRON AGE of Nov. 2, was divided between a Michigan and an Ohio builder.

It is estimated that the complete crane and tool order involved the expenditure of more than \$500,000. This order is merely an initial one and a large list to go direct to Gary is being figured on. The Union Railroad, the Steel Corporation inter-plant rail system in the Pittsburgh district, has closed for a 600-ton wheel press which will be furnished by the Chambersburg Engineering Co., Chambersburg, Pa. The latter also will furnish two board drop hammers for Hubbard & Co., Pittsburgh. The Pennsylvania Railroad and the Pittsburgh & Lake Erie Railroad lists still are pending, but action is expected soon.

The Shaw Electric Crane Co., Muskegon, Mich., will furnish 28 four-hook cranes of the following capacities and spans to the National Tube Co.: Four 10-ton, 84-ft. span; four 10-ton, 52-ft. span; eight 10-ton, 60-ft. span; one 20-ton, 60-ft. span; seven 10-ton, 106-ft. span; four 10-ton, 76-ft. span. The Alliance Machine Co., Alliance, Ohio, was awarded 13 standard cranes of the following capacities and spans by the same company: One 10-ton, 84-ft. span; one 10-ton, 5-ton auxiliary, 84-ft. span; one 10-ton, 61-ft. span; two 15-ton,

5-ton auxiliary, 61-ft. span; three 5-ton, 22-ft. span; one 10-ton, 5-ton auxiliary, 37-ft. span; two 10-ton, 37-ft. span; one 5-ton, 37-ft. span; one 20-ton, 84-ft. span.

The tool award of the National Tube Co. was one 72-in. x 77-in. x 22 ft. open side Cincinnati planer; one 36-in. x 36-in. x 14-ft. open side Gray planer; one 48-in. x 48-in. x 20-ft. open side Gray planer; one 6-ft. American radial drill; one Cincinnati universal milling machine; one 42-in. Bullard vertical boring mill; one Niles-Bement-Pond horizontal boring machine; two 18-in. x 10-ft. American lathes; one 24-in. x 14 ft. Greaves & Klusman lathe; one 24-in. Springfield lathe; one 26-in. open side Coulter crank-shaper.

The week's sales of cranes included one 50-ton overhead for the South Side Pittsburgh works, Jones & Laughlin Steel Co., to the Morgan Engineering Co., Alliance, Ohio; one 15-ton, 42-ft. span, 20-ft. lift, hand-power crane for the Yorkville, Ohio, works, Wheeling Steel Corporation, placed with the Whiting Corporation, Harvey, Ill., and two 2-ton 33-ft. span cranes for the H. J. Heinz Co., Pittsburgh, to the Northern Engineering Works, Detroit. The Cutler Steel Co., Pittsburgh, with a plant at New Cumberland, W. Va., is in the market for a 10-ton crane.

The Beaver County Light Co., 435 Sixth Avenue, Pittsburgh, has plans under way for a new power house at New Brighton, Pa., to cost \$35,000. H. L. Fullerton, 5444 Kincaid Street, is engineer.

The Raymilton Oil Refining Co., Raymilton, Pa., has purchased a site at Mercer, Pa., for a new refinery. The present plant will be removed to the new location, and the capacity increased.

The Board of Public Works, Wheeling, W. Va., has commissioned J. N. Chester, Union Building, Pittsburgh, engineer, to prepare plans for a new power house, electrically-operated pumping plant, intake and filtration plant at the municipal waterworks, to cost about \$1,000,000, including five steel tanks, 1,000,000-gal. capacity, total.

The Federal Enameling & Stamping Co., McKees Rocks, Pa., will soon take bids for a three-story addition on Thompson Avenue. Frank Frimmer, 1133 Charles Street, is engineer. C. E. Chriatian is in charge.

The Harbison-Walker Refractories Co., Oliver Building, Pittsburgh, has arranged a program for extensions and improvements at its Blandburg, Pa., plants to cost approximately \$1,000,000.

The Guilbert Steel Co., Diamond Bank Building, Pittsburgh, now being organized under State laws to make application for a charter on Nov. 14, has tentative plans for a one-story plant, 55 x 200 ft., in the West Park district, to cost approximately \$100,000, including equipment. It will manufacture general steel products, with works to include a fabricating department. O. E. Guilbert and R. G. Stewart head the company, which is represented by John Rebman, Jr., 43 St. Nicholas Building.

The National Metal Molding Co., Fulton Building, Pittsburgh, has completed plans for a one-story addition to its plant at Ambridge, Pa., 100 x 100 ft.

The Superior Auto Accessories Co., 1342 Forbes Street, Pittsburgh, has leased a site at Baum Boulevard and Woodworth Street, for a new one-story plant.

The Pennsylvania Silverware Co., Kane, Pa., recently organized, has acquired the local plant and business of the Oneida Fountain Supply Co. Production will be continued in this line, with the addition of metal and silverware specialties. Increased capital has been arranged for expansion. F. C. Westfall, former official of the Oneida company, will be president and general manager of the new organization; W. W. Browning is general superintendent.

The Standard Steel Spring Co., Coraopolis, Pa., has awarded contract to the Pittsburgh Bridge & Iron Works, Pittsburgh, for a one-story addition, 65 x 140 ft.

The Board of Works, Pittsburgh, will build a power house in connection with the proposed new hospital at the Leech Farms to cost \$180,000. J. P. Brennan, Municipal Building, Northside, is architect.

The Belgrade Glass Co., Buckhannon, W. Va., is planning to rebuild its machine shop and other departments destroyed by fire Oct. 29, with loss estimated at \$35,000.

The Alley Glass Co., Shinnston, W. Va., has tentative plans under consideration for a new plant, including power house, machine shop and other departments, estimated to cost \$250,000, including equipment. L. E. Alley is president.

The United States Engineer Office, Huntington, W. Va., is planning for a new power house at Dam 30, Ohio River, to cost \$35,000.

The Huntington Iron Works, Huntington, W. Va., operating a structural steel fabricating plant, has plans under consideration for an addition to double, approximately, the present capacity.

The Mercer Refining Co., Franklin, Pa., is said to be planning the installation of new transmission, conveying and other machinery at its refinery. W. C. Hastings is treasurer.

Philadelphia

PHILADELPHIA, Nov. 6.

A ONE-STORY power house will be built by the Wilmoit Fleming Iron & Steel Co., 956 Foulkrod Street, Philadelphia, at its new plant to be located at Cottman and G Streets. Wilmoit Fleming is treasurer.

The American Ice Co., Sixth and Arch Streets, Philadelphia, is taking bids until Nov. 13 for a new plant at Duncannon and Mascher Streets, estimated to cost \$60,000.

Handling machinery, producers, boilers and other equipment will be installed by the United Gas Improvement Co., Broad and Arch Streets, Philadelphia, in an addition to the Philadelphia Gas Works, Station B, Richmond and Tioga Streets, estimated to cost approximately \$1,000,000. The company will also build an addition to its plant at Delaware and Buckius Streets.

The Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will take bids until Nov. 21, for 350 wheels for landing gears, for use at the Philadelphia Navy Yard, schedule 281.

A power house, ice and refrigerating plant will be installed in the new factory of the Breyer Ice Cream Co., Ninth and Cumberland Streets, Philadelphia, on a two acre site just acquired on Forty-third Street. It is estimated to cost \$500,000 with machinery.

The Scott Paper Co., Foot of Market Street, Philadelphia, has disposed of a preferred stock issue of \$642,700, a portion of the proceeds to be used in connection with extensions to its plant at Chester, Pa.

The John B. Stetson Co., Columbia Avenue and Fifth Street, Philadelphia, will build a one-story machine and repair shop, 75 x 125 ft., in connection with new buildings at its hat factory. J. O. Potts, Montgomery Avenue and Fifth Streets, is architect.

John H. Shriner, Philadelphia, will install a refrigerating and cold storage plant in the five-story building at 8 North Front Street, recently acquired.

The Foreign Trade Bureau of the Philadelphia Commercial Museum, Thirty-fourth Street, has received an inquiry from a company at Zawiercie, Poland, for cement manufacturing machinery for installation in a local plant, to include a main rotating furnace with capacity of 40,000 metric tons per year, cooling equipment, etc. Full information available upon request.

The Philadelphia & Reading Railroad Co., Reading Terminal, Philadelphia, has preliminary plans for enlargements in its engine house and repair shops at Newberry Junction, Pa.

The Franklin Institute, 15 South Seventh Street, Philadelphia, has had plans prepared for a new four-story electrical laboratory building, 55 x 110 ft., at Nineteenth and Cherry Streets, estimated to cost approximately \$250,000, including equipment.

Motors, controllers and other electrical and mechanical power equipment will be installed in the new eight-story addition to the plant of the Ketterlinus Lithographic Mfg. Co., Fourth and Arch Streets, Philadelphia, for which bids are being asked. The Ballinger Co., Twelfth and Chestnut Streets, is architect.

Henry Hugh, Lime and Chester Streets, Lancaster, Pa., has preliminary plans for a one-story machine and repair shop at Rockland and Pennsylvania Streets, 25 x 50 ft. Guy Linville, 509 South Lime Street, is architect.

The Lycoming Motors Corporation, Williamsport, Pa., has perfected a new automobile motor and will make enlargements in its plant to develop an output of about 125 motors per day. The present working force of 700 will be increased.

The Altoona & Logan Valley Electric Railway Co., Altoona, Pa., has plans in preparation for an addition to its power house. The installation will include a generator, condensing engine, surface condenser and auxiliary equipment. The F. D. Hain Co., 203 Coleridge Avenue, Llyswen, Altoona, is engineer.

Fire, Oct. 29, destroyed a portion of the plant of the Gaylord & Butler Pipe Co., Pine Brook, Scranton, Pa., manufacturer of heating equipment, etc., with loss estimated at \$40,000. It is planned to rebuild.

Motors, controllers, transmission machinery and other equipment will be installed in the new two-story printing plant, 30 x 160 ft., to be erected by the New Castle News, New Castle, Pa., estimated to cost \$80,000.

The Harrisburg Mfg. & Boiler Co., Nineteenth and Naudain Streets, Harrisburg, Pa., has acquired property at Bolton and Brookwood Streets for expansion.

The Lloyd Forge Co., Annville, Pa., has secured a site from the Steinmetz Estate for a new plant to manufacture turnbuckles and other products. The company was formed

recently with a capital of \$75,000, with John H. Lloyd, Lebanon, Pa., president, and W. W. Mish, Annville, treasurer.

The Girard Model Works, Inc., Girard, Pa., is planning for the installation of equipment to manufacture small springs, wire specialties, etc. S. L. Connell is head.

A. F. Teel, Wind Gap, Pa., has plans in progress for a slate mill to cost \$50,000, with grinding, cutting, finishing and other machinery.

Chicago

CHICAGO, Nov. 6.

THE Chicago & Northwestern has started buying against its list, thus far having closed for two crank planers, an 18-in. lathe, an upright drill, and a shear. The New York Central Lines have bought a 42-in. boring mill and a 5-ft. radial drill from a local dealer. The Chicago, Burlington & Quincy has not made any further purchases, but is expected to close the remainder of its general list soon. Except for occasional purchases of one or two machines, buying by automobile manufacturers has ceased. The Studebaker Corporation, South Bend, Ind., has purchased two additional "Simpli-matic" turret lathes, while the Nash Motors Co., Kenosha, Wis., has closed for a lapping machine and a drill press.

Business from miscellaneous sources is somewhat better, several fair-sized purchases having been reported. The Apollo Player Piano Co., De Kalb, Ill., has placed orders for a No. 3 universal milling machine, a 16-in. crank shaper, universal cutter and reamer grinder, and a 20-in. drill press. The Mantle Lamp Co. of America, Chicago, has purchased an 18-in. engine lathe and a 16-in. shaper. The Crescent Steel Furnace Co., a new company located in Cherry Street on Goose Island, Chicago, has purchased a tool room outfit, consisting of a shaper, milling machine, engine lathe, drill press and planer. No further price changes are reported.

The Wisconsin Steel Works, South Chicago, has ordered a 15-ton three-motor skullcracker crane with magnet drum and 85-ft. 9-in. span from the Morgan Engineering Co. The Shepard Electric Crane & Hoist Co. has recently taken the following orders: A 2-ton hoist, the Wisconsin River Paper & Pulp Co., Neenah, Wis.; 4-ton hoist, the Grafton Foundry Co., Grafton, Wis.; 1-ton hoist, the Illinois Steel Bridge Co., Jacksonville, Ill.; a 1½-ton hoist, the Lake Erie & Western Railroad; two 1-ton hoists, the Nash Motors Co., Kenosha, Wis.; a 1-ton hoist with 2¼-hp. back-gear motor, the Studebaker Corporation, South Bend, Ind.; a ½-ton hoist, Doerman & Roehrer, Cincinnati; a ½-ton hoist, the Steinman & Meyer Furniture Co., Cincinnati, and three 1½-ton ice plant cranes, the Vilter Mfg. Co., Milwaukee.

Manton & Smith have purchased the one-story steel constructed factory at 3323-49 West Grand Avenue, Chicago, and will occupy it for the manufacture of ornamental and architectural iron and bronze work. The building, which is 150 x 216 ft., will undergo extensive alterations. The partners, James S. Manton and Edward Smith were formerly connected with the Winslow Brothers Co., Chicago. They have the contract for all of the ornamental iron and bronze work for the London Guarantee & Accident Co., Building, Chicago, now under construction, and have just completed a similar contract for the Chicago Juvenile Court building.

The Houghton Mfg. Co., 115 South Clinton Street, Chicago, recently incorporated with \$10,000 capital stock, will manufacture automobile tire pumps and a number of Ford accessories not yet determined. The company has leased 2000 sq. ft. of floor space at the above address and has purchased its initial equipment. Officers are H. P. Houghton, president and treasurer, and Rudolph Probandt, secretary.

The Kokomo Steel & Wire Co., Kokomo, Ind., has started the construction of a new building, 90 x 425 ft., to house its galvanizing department, estimated cost \$50,000.

The Fort Wayne Foundry & Machine Co., Fort Wayne, Ind., will build an addition, 36 x 85 ft., to be used as an assembling room.

The Andrews Wire & Iron Works, Rockford, Ill., will erect two additions which will double the size of its plant. The estimated cost, exclusive of heating, lighting and plumbing, is \$20,000.

The Roos Co., Harrison and Circle Avenues, Forest Park, Ill., manufacturer of cabinets, is taking bids for a one and

two-story addition, 150 x 425 ft., to cost about \$200,000, including machinery. Holabird & Roche, 104 South Michigan Avenue, Chicago, are architects.

The Union Pacific Railroad Co., Omaha, Neb., has tentative plans for an addition to its locomotive repair shops and engine house at Columbus, Neb.

The Commanding Officer, Rock Island Arsenal, Rock Island, Ill., will take bids until Nov. 17 for 160 steering clutch springs, 50 drag link springs, 50 draw bar springs, 320 roller frame springs, and 10 support springs, circular 416-A; also, for 130 brass oil pressure gages, circular 414-A; and until Nov. 15, for 420 master clutch friction disks, 220 intake heater gaskets, and 320 cylinder head gaskets, circular 413-A.

Voightmann & Co., 445 West Erie Street, Chicago, manufacturers of metal windows, etc., have preliminary plans under way for a new one-story and basement addition. Mundie & Jensen, 39 South La Salle Street, are architects.

The Interstate and Foreign Trade Department, Chicago Association of Commerce, 10 South La Salle Street, Chicago, reports an inquiry from a company in New Orleans, for a quantity of low pressure crude oil burners, rotary or turbine type, No. 1591; also, from a company at Oakland, Cal., for 5000 drop forge wrenches, No. 1668. Full information on request at the office noted.

The International Harvester Co., of America, 606 South Michigan Avenue, Chicago, has plans for a one-story motor service and repair shop at Clybourn and Diversey Avenues, estimated to cost \$65,000.

The Elgin Stove & Oven Co., 14 Chicago Street, Elgin, Ill., has awarded a contract to L. Balkin, 538 South Clark Street, Chicago, for a three-story addition at State and Schiller Streets, to cost \$100,000, including machinery.

The Board of Directors, Memorial Hospital, Harvey, Ill., has completed plans for a new one-story power house. Chatten & Hammond, 64 East Van Buren Street, Chicago, are architects.

The Continental Gas & Electric Corporation, Omaha, Neb., has acquired the plants and properties of the Union Power & Light Co., operating in Nebraska, Iowa and South Dakota. Plans are under way for extensions and improvements. Rufus E. Lee is president.

The Carter-Mayhew Mfg. Co., Fifth Avenue, South, Minneapolis, Minn., manufacturer of iron and steel products, has plans under way for a new one-story foundry, 60 x 100 ft., estimated to cost \$25,000.

Fire, Oct. 29, destroyed a portion of the plant of the Columbus Auto Co., Columbus, Neb., manufacturer of automobile parts, etc., with loss estimated at \$50,000. It is planned to rebuild.

The Common Council, Carroll, Iowa, will install two electrically-operated pumping plants in connection with a new sewerage system.

The City Council, Muscatine, Iowa, has commissioned Arthur L. Mullergren, Kansas City, Mo., engineer, to prepare plans for a municipal electric light and power plant to cost approximately \$350,000, with machinery.

The plant of the Fremont Mfg. Co., Fremont, Neb., occupied by the Sure Hatch Incubator Co., and the Crystal Refrigerator Co., subsidiary organizations, was almost completely destroyed by fire Oct. 23, with loss estimated at \$200,000, including buildings and machinery. It is planned to rebuild.

The White Lake Co-Operative Creamery Association, White Lake, S. D., will build a machine shop in connection with its proposed new plant. J. L. Jensen is secretary and manager.

Buffalo

BUFFALO, NOV. 6.

CONTRACT has been awarded by the Continental Heater Co., Otter Street, Dunkirk, N. Y., for a one-story addition, 65 x 220 ft., estimated to cost \$25,000.

The Onondaga Litholite Co., 102 Beech Street, Syracuse, N. Y., manufacturer of composition stone products, has plans in progress for a one-story addition, 40 x 600 ft., for cutting, finishing and other work, to cost about \$50,000. The Watson Engineering Co., 4614 Prospect Avenue, Cleveland, is engineer.

The Power Corporation of New York, Watertown, N. Y., recently organized by officials of the Northern New York Utilities, Inc., of the same place, is disposing of a bond issue of \$5,000,000, the proceeds to be used for the acquisition and construction of new power plants. John N. Carlisle is president of both companies.

The American Can Co., 120 Broadway, New York, plans for a new four-story building on Parce Avenue, Fairport, N. Y., 75 x 175 ft., to cost \$45,000.

The Ontario Knife Co., Empire Street, Franklinville, N. Y., is considering the erection of an addition, size and details still to be determined.

E. H. Norton and associates, Brockport, N. Y., have acquired the local plant and business of the Decker Mfg. Co., manufacturer of power spraying equipment. Extensions are contemplated. Mr. Norton was previously connected with the company.

The Norwich Gas & Electric Co., Norwich, N. Y., plans for the construction of a new power line and other extensions to cost approximately \$30,000.

H. H. Masters, 87 Virginia Place, Buffalo, is arranging for the installation of additional machine shop equipment.

A power house and refrigerating plant will be installed in the proposed new county home to be erected by the Erie County Board of Supervisors, City Hall, Buffalo, at Alden, N. Y. Kidd & Kidd, 234 Delaware Avenue, Buffalo, are architects.

The Adirondack Power & Light Corporation, Glens Falls, N. Y., has acquired the Glens Falls Gas & Electric Light Corporation, Consolidated Light & Power Co., Whitehall, N. Y., and the Ballston Spa Light & Power Co., Ballston Spa, N. Y. The properties will be consolidated and extensions and improvements made.

Cincinnati

CINCINNATI, NOV. 6.

BUSINESS in machine tools is showing a steady improvement, and while railroad buying, which formed the biggest part of the volume during October has fallen off, orders from industrial concerns are pretty well filling the gap, and the early October rate of buying bids fair to be maintained, if not increased the present month. Planers are particularly in demand, one manufacturer in this district having booked orders for 10 the past week, and another a single order for six.

The Missouri-Kansas-Texas Railway also placed an order for three planers and is buying other equipment. A railroad equipment manufacturer closed for six planers of a special design. An Eastern railroad bought two heavy duty lathes in the local market, and a Dayton foundry placed an order for three used Bullard automatics. The J. H. Day Co., Cincinnati, bought two radial drills and the Chicago Mill & Lumber Co. is also reported to have bought a number of tools for a new plant in Chicago. The National Cash Register Co., Dayton, was a buyer in a small way.

No action has been taken on the latest list of four machines issued by the Southern Railroad, although on a previous inquiry one machine has been purchased. Local manufacturers are working on the Pittsburgh & Lake Erie Railroad list E-1566, and it is expected that purchases will be made within two weeks. Orders for scattered machines from industrial and automotive sources continue to be booked by local manufacturers, and taken as a whole, the future of the industry is brighter than it has been for at least two years.

The National Elevator Co., Indianapolis, has purchased property along the Big Four tracks, and is having plans prepared for the erection of a grain elevator to cost with equipment about \$75,000.

Core making and molding equipment will be installed in the addition being erected to the plant of the Advance Foundry Co., Dayton, Ohio. The extra space will enable the company to increase its capacity 50 per cent.

The Tucker Boiler Works Co., Newark, Ohio, will engage in the manufacture of large tanks for the gas and oil trade and is planning an addition to its present works on Indiana Street. It will also engage extensively in the welding business. William Tucker is president.

The buildings and equipment of the Rapid Rim Co., Huntington, Ind., has been sold at receiver's sale to W. H. Collins and associates of Chicago and Fort Wayne, Ind., who will finish the buildings and install equipment for the manufacture of enamel ware.

The old car shops of the Chicago & Eastern Illinois Railroad at Brazil, Ind., including the round house and engine house, abandoned when the machinery and equipment were moved to Evansville, have been taken over by Hammond & Jeffers, operating at Kansas City and Indianapolis. The shops are to be used on car repair work for the Cincinnati, Indianapolis & Western and other railroads.

Cleveland

CLEVELAND, Nov. 6.

LOCAL machine tool business shows improvement. While no round lot purchases are reported, dealers are getting a very satisfactory volume of orders which are usually for single machines, although some are for two or three tools. Buying is from widely scattered sources, and is mostly for replacements. October sales of some dealers showed a fair gain over any of the few preceding months. The demand for new machinery is better than for used tools. Turret lathe manufacturers are getting quite a few orders for small machines from the brass industry. No railroad purchases are reported.

In the automotive field the trade is looking for considerable business from the Durant interests for equipping a new plant at Flint, Mich., for making the Star car, but so far machine tool manufacturers have been unable to secure any definite information as to the requirements of this plant. An inquiry has come out for about 10 used machines, mostly presses and shears for the Detroit service department of an automobile spring company. The Horsburgh & Scott Co., Cleveland, has purchased a 12 x 48-in. Pratt & Whitney thread milling machine.

No further price changes are reported but intimations are coming from some machine tool builders that they will probably advance prices shortly.

Some slowing down in the automotive industry is indicated by curtailment this month in operations by foundries having large orders for motor castings. The employment of labor in the various Cleveland industries increased 2 per cent during October, according to the monthly report of the Chamber of Commerce that is compiled from reports made by 100 plants having 500 or more employees. Iron and steel and metal-working plants outside of the automotive field showed a gain of 5.90 per cent in the number of employees on Oct. 31, as compared with Sept. 30. Automobile and allied plants reported a falling off of 5.10 per cent in employment.

The National Screw & Tack Co., Cleveland, is having plans prepared for a five-story addition to relieve some of the congestion that now exists in the various departments.

The Lippitt Textile & Machine Co., Cleveland, has been incorporated with a capital stock of \$80,000 by E. Lippitt and others and will engage in the manufacture of knitting machines. The company has leased the plant of the Cleveland Underwear Co.

The McCorkle Screen Products Co., Akron, Ohio, in which H. L. McCorkle and others are interested, will erect a plant for the manufacture of window and door screens, weather strips and other products.

The Towmotor Co., Cleveland, reports the recent receipt of four repeat orders, one from the United Alloy Steel Corporation, Canton, Ohio; one from Herbrandt Co., Fremont, Ohio, and an order for two machines from Ball Brothers, making a fleet of eight operated by the latter concern.

The Henle Co., Cleveland, has been incorporated and has established a plant at 1838 Central Avenue for the manufacture of advertising signs. Edward J. Henle is president.

The Ideal Electric & Mfg. Co., Mansfield, Ohio, has placed a contract with the Austin Co., Cleveland, for an additional factory building, 100 x 325 ft., with a 20-ton crane aisle 50 ft. wide and two machine shop aisles 25 ft. wide.

Detroit

DETROIT, Nov. 6.

THE Michigan Central Railroad Co., Detroit, has taken bids on a general contract for a new one-story car repair shop, 30 x 200 ft., at Niles, Mich., and will soon lay foundations.

The Common Council, Portland, Mich., is arranging for the installation of new equipment at the municipal power plant, to cost close to \$15,000.

The Whitehead & Kales Co., River Rouge, Mich., operating a structural steel works, plans the installation of a new angle shear, punch and other equipment.

The Witters Motor Co., 147 Weston Street, S. E., Grand Rapids, Mich., has awarded contract to L. P. Oltman, 110 Pearl Street, N. W., for a new two-story service and repair

building, 100 x 110 ft., to cost \$25,000, exclusive of equipment.

The Ford Motor Co., Highland Park, Mich., has had plans drawn for a two-story gas producer plant, 60 x 150 ft., at its proposed glass factory at Flat Rock, Mich., estimated to cost \$100,000. The entire plant will represent an investment of close to \$1,000,000. Albert Kahn, 1000 Marquette Building, Detroit, is architect.

The Detroit Edison Co., Detroit, is arranging for a bond issue of \$15,000,000, a portion of the proceeds to be used for extensions and improvements.

The Kalamazoo Stationery Co., Kalamazoo, Mich., has tentative plans for additions to the paper mill at Taylorville, Mich., recently acquired, to double the present capacity. Equipment will be installed for 500 employees.

The Bryant Paper Co., Kalamazoo, Mich., will commence the erection of a new one-story power plant, 60 x 100 ft., to cost approximately \$100,000, including equipment.

The Kawneer Mfg. Co., Niles, Mich., manufacturer of metal store fronts, will erect an addition to its plant in the near future. The new building will be 60 x 260 ft., three stories, of brick and steel.

Baltimore

BALTIMORE, Nov. 6.

JOHNS S. METCALF & CO., 108 South La Salle Street, Chicago, engineers, have been engaged by the Baltimore & Ohio Railroad Co., Baltimore, to prepare plans for new grain elevators at Locust Point to replace those destroyed by fire last July with loss of \$1,000,000. Bids for machinery will be called within 90 days, to include power equipment, belt conveyors, mechanical draft apparatus, cleaning and drying equipment, etc. The plant is estimated to cost \$3,000,000.

The Purchasing Agent, Post Office Department, Washington, will take bids until Nov. 15 for 2200 boxes of lock washers; also until Nov. 17, for 200 truck casters with iron wheels.

The Quartermaster, United States Army, Washington, will receive bids until Nov. 10 for one 10-hp. motor, 220-volt, single phase, 60-cycle, circular 235.

The Battey Machinery Co., Rome, Ga., is in the market for an automatic gear cutter, used, good condition.

The Common Council, Davidson, N. C., has plans in progress for a municipal electric light and power plant, for which bonds for \$60,000 were voted recently, including waterworks improvements.

The Dunlevi Lumber Co., Inc., Savannah, Ga., recently organized to consolidate the company of the same name and the Southern Lumber Co., both of Allenhurst, Ga., has plans under consideration for new mills, with power house and machine shop, to increase the capacity to 50,000,000 ft. per year. E. V. Dunlevi is president.

The Thompson Auto Repair Co., 509 West Marshall Street, Richmond, Va., plans for the installation of a lathe and other machine shop equipment.

G. W. Morse & Sons, Forest Hill, Md., are planning for the purchase of a boring machine for boring heavy wood posts.

The United States Engineer Office, Norfolk, Va., will take bids until Dec. 4 for two power houses at Fort Story, Cape Henry, Va., as per specifications on file.

The Georgia Talc Co., Asheville, N. C., has inquiries out for motors, transformers and other equipment.

The General Purchasing Officer, Panama Canal, Washington, will take bids until Nov. 22 for the following equipment for the canal zone: Machine bolts, steel rivets, steel rope, high-tension insulators, electric motor transformer, copper wire, fuses and renewals, padlocks, steel filing cabinets, etc., all as set forth in circular 1500.

The Shenandoah Valley Co-Operative Milk Producers' Association, Strasburg, Va., has plans under way for a new power house and ice and refrigerating plant in connection with its new distributing works. J. L. Barr, 224 St. Paul Street, Baltimore, is consulting engineer.

D. C. Elphinstone, 408 Continental Building, Baltimore, machinery dealer, is making inquiries for one electrically operated crane, 75 ft. boom, with capacity for handling a 2-yd. clamshell bucket.

The Butters-Camp Mfg. Co., Atlanta, Ga., manufacturer of automobile locks and locking devices, has preliminary plans for a new factory for a large increase in capacity.

Officials of the Potomac Public Service Co., Hagerstown, Md., have organized the Williamsport Power Co., Williamsport, Md., to build and operate a local steam-operated power plant to cost about \$1,500,000. It will have an initial capacity of 18,000 kw., which later will be increased to 40,000 kw.

The Night & Day Service Co., 900 West Broad Street, Richmond, Va., is planning for the installation of a drill press, lathe and other equipment. C. B. Hatch is head.

The Atlantic Ice & Coal Corporation, Athens, Ga., has completed plans for a new cold storage and refrigerating plant to cost \$60,000.

The Terminal Bus Line Co., Asheville, N. C., will install a complete machine and repair shop in its new three-story terminal, estimated to cost in excess of \$80,000.

The Chief Signal Officer, United States Army, Washington, will receive bids until Nov. 18 for 120 pliers, 500 machine screws, 500 spiral springs, 500 brass washers, 500 crank handles, 500 crank pivots, 100 connectors, 200 ft. of lead sleeving, 600 terminal strips, etc., circular 11229—A-4-C. P.; until Nov. 20 for switchboard supplies, including wire, connecting blocks, terminals, induction coils, etc., circular 12873—1 C. P.

The Columbus Electric & Power Co., Columbus, Ga., is arranging an appropriation of \$250,000 for hydroelectric power plants and transmission lines. R. M. Harding is general manager.

The Studebaker Automobile Agency, Washington, has awarded contract to the Wardman Construction Co., Washington, for a four-story factory branch and service building, 60 x 100 ft., on Fourteenth Street, N.W., to cost \$75,000.

The General Ice Delivery, Inc., 117 Campbell Avenue Roanoke, Va., has plans in progress for a two-story service and machine repair works, 25 x 104 ft. Eubank & Caldwell, Boxley Building, are architects.

The Pacific Coast

SAN FRANCISCO, Oct. 31.

BIDS will be taken at once by the Goodrich Rubber Co., 401 Mission Street, San Francisco, for its new plant on West Second Street, six stories, 65 x 160 ft., estimated to cost approximately \$150,000. H. C. Baumann, 251 Kearny Street, is architect.

The Union Pacific Railroad Co., Engineering Department, Omaha, Neb., has plans in progress for shop buildings in the vicinity of the Belvedere Gardens, Los Angeles, to cost in excess of \$80,000.

The Madera Sugar Pine Co., Madera, Cal., has completed plans for a new saw mill, power house and tramway system, estimated to cost \$80,000. Work will soon be commenced.

The United States Molybdenum Metals, Ltd., 16 Natoma Street, San Francisco, operating in the St. Helens mining district, near Spirit Lake, Wash., has purchased the former shipyards of the Standifer Shipbuilding Co., Vancouver, Wash., as a site for a new metal reduction plant, including power house, machine shop and other structures.

Beers & Bennett, Vancouver, Wash., are considering plans for a new mill on the Nehalem River, near St. Helens, Ore., to be equipped for a capacity of 20,000 ft. per day. A power house will also be erected.

The Great Western Meter Co., Emeryville, Cal., has awarded contract to H. P. Nelson, 1947 Blake Street, Berkeley, Cal., for a new one and two-story plant, estimated to cost \$30,000.

Charles A. Criss, Anaheim, Cal., has had plans prepared for three new buildings for the manufacture of cement, brick and kindred products, estimated to cost \$35,000.

The Yamhill Electric Co., Newberg, Ore., has acquired the municipal power plants at Sheridan, Amity and Willamina, Ore. Extensions and improvements will be made, including the installation of additional equipment, and the properties merged.

The National Motor Bearing Co., San Francisco, has leased the building at 1609 Pine Street for a new plant to manufacture die-cast metal and bronze back motor bearings and kindred automotive equipment. A. S. and L. A. Johnson head the company.

The Black Package Co., 1025 Van Ness Avenue, Fresno, Cal., will install an ice and refrigerating plant in its new two-story building, for which plans are being prepared, estimated to cost approximately \$150,000.

The Gulf States

BIRMINGHAM, Nov. 6.

THE Oil Belt Power Co., Eastland, Tex., has plans under way for an addition to its electric generating plant to double the present capacity. The installation is estimated to cost in excess of \$200,000. J. E. Lewis is vice-president and general manager.

The McIntosh Utilities Co., McIntosh, Fla., recently organized, has completed plans for a new ice-manufacturing and cold storage plant to cost \$50,000. N. A. Russell is secretary and treasurer.

The Houston Lighting & Power Co., Houston, Tex., has

arranged for an increase in capital from \$3,000,000 to \$4,500,000, a portion of the proceeds to be used for extensions.

An ice-manufacturing and refrigerating plant will be installed in the two-story municipal market, 150 x 200 ft., to be erected at Third Avenue and Twenty-third Street, Birmingham, by the City Council, estimated to cost \$200,000.

The Rodriguez Spring Wheel Co., 602 Third Street, Baton Rouge, La., recently organized, is perfecting plans for a new factory to manufacture spring wheels for automobiles and trucks, estimated to cost \$50,000. A. J. Rodriguez is president.

The Bastrop Pulp & Paper Co., Bastrop, La., has arranged for a bond issue of \$650,000, a portion of the proceeds to be used for extensions and improvements.

The Griswold Oil & Refining Co., Henrietta, Tex., has acquired the local refinery of the Beacon Oil Co. and plans for extensions and improvements. A pipe line with pumping plants will be constructed.

The Stickle Lumber Corporation, Maple Avenue, Dallas, Tex., has plans for a new mill, 100 x 200 ft., with power house, 60 x 60 ft., estimated to cost \$80,000. R. O. Jameson, American National Bank Building, is consulting engineer.

The Common Council, Birmingham, is planning for extensions in the municipal electric power plant at North Birmingham, including the installation of additional equipment. William L. Harrison is chairman of the Board of Public Utilities.

The United States Gasoline Corporation, Texas City, Tex., has acquired about 75 acres as a site for a new refinery. The initial unit will be equipped for a daily capacity of 100,000 gal. and is estimated to cost \$250,000. Three additional units will be built later.

The Ashbrook Veneer Co., Lumberton, Miss., recently organized, will establish a local mill and will install rotary cutters, motors, transmission equipment, etc. C. B. Ashbrook heads the company.

The Swiftsure Petroleum Co., Texas City, Tex., will make extensions in its storage and distributing plant, including the installation of two steel storage tanks, each with capacity of 55,000 bbl.

The St. Petersburg Welding & Machine Co., St. Petersburg, Fla., is perfecting plans for the establishment of a machine shop. It was organized recently with T. D. Orr as president, and A. M. Galaher, treasurer.

Fire, Oct. 22, destroyed a portion of the plant of the Dallas Paper Co., Law Street, Dallas, Tex., with loss estimated at \$60,000, including equipment.

The Spinks Ice & Mfg. Co., Shubuta, Miss., is planning for the installation of a new electric power plant, to be operated as an auxiliary of its hydroelectric generating station. T. M. Spinks is head.

E. W. Parker, Curry Building, Tampa, Fla., is arranging for the purchase of a steam shovel for grading operations.

The County Commissioners, Fort Pierce, Fla., has completed plans for a two-story service and repair shop, 60 x 120 ft., for County automobiles and trucks.

The Common Council, Plaquemine, La., is arranging for the sale of a bond issue of \$150,000, the proceeds to be used for the installation of a municipal electric power plant.

W. A. Hoffman and E. E. Burleigh, Daytona, Fla., are organizing a company to construct and operate a plant for the manufacture of sash, doors, etc. A site, 155 x 380 ft., has been selected and plans are being drawn. Most of the machinery will be electrically operated. Mr. Hoffman will be president of the company.

The Louisiana Sand & Gravel Co., Monroe, La., is making inquiries for a 200-hp. boiler, marine type, with auxiliary equipment. T. E. Stephenson is president.

Milwaukee

MILWAUKEE, Nov. 6.

CURRENT sales of machine tools remain limited largely to single items, but trade is slowly overcoming its spotty characteristics. Inquiry is coming from a greater variety of sources and some classes of tools are in broader demand than in two years. The numerous vocational or continuation schools erected by Wisconsin municipalities have also reached the stage where purchases of equipment are being made. Public garage and repair shop tools are moving actively and absorbing considerable used equipment, although new machinery is also being purchased. Less complaint is being heard concerning the pressure of used machinery stocks in competition with new equipment. Production of milling machines has been increased further.

The Gurney Refrigerator Co., Fond du Lac, Wis., manufacturer of iceboxes, will start work immediately on a three-story addition, 60 x 150 ft., and extensions of the engine room and boiler house, the work to cost approximately \$100,000. F. J. Stepinski, local architect, is in charge. A miscellaneous list of machinery, largely for wood and sheet metal working processes, will be required.

The Ogren Motor Car Co., 692-698 National Avenue, Milwaukee, manufacturer of passenger automobiles, has increased its authorized capitalization from \$500,000 to \$1,000,000 to finance the enlargement of the factory, purchase of additional equipment, and generally accommodate the growth of the business. Details of the program have not yet been made public. Fred G. Smith, 115 Grand Avenue, is president and general manager.

The Common Council, Sheboygan, Wis., has appropriated \$50,000 to the local Board of Vocational Education to buy machinery and other equipment for the vocational institute division of the new Sheboygan high school, now being completed. The list of requirements is now being compiled.

The Wisconsin Sheet Metal Works, 636 Twelfth Street, Milwaukee, has purchased the real estate and buildings at 2928 Lisbon Avenue, which will be remodeled and re-equipped to provide an increase of 150 to 200 per cent of the capacity of the present works.

The Brown County Motors Corporation, 445 South Jackson Street, Green Bay, Wis., has let the general contract to the H. J. Selmer Co., local, for a brick and steel sales and service building, 50 x 150 ft., part two stories and basement, estimated to cost \$32,000. Joseph Plaskowski is president.

The Combination Door Co., Fond du Lac, Wis., has engaged B. E. Mehner, local architect, to design a new three-story factory and warehouse, 50 x 174 ft., of brick and concrete, with steel sash, costing about \$60,000 with wood-working and other machinery. L. J. Schmidt is president.

The A. F. Geisinger Mfg. Co., Milwaukee, has been organized with \$25,000 capital stock by Arthur F. Geisinger, 1007 Twenty-second Street; Albert J. Holzhauser and Daniel Fisher to engage in the production of machinery and mechanical equipment. A statement detailing plans for a factory will be issued shortly.

The Prentiss-Wabers Co., Wisconsin Rapids, Wis., manufacturer of hot air heating units for tourists and sportsmen, has plans for a two-story brick and concrete extension, 34 x 110 ft., to contain the enameling, assembling and testing floors and shipping room. The capital stock is being increased from \$60,000 to \$100,000 for construction and equipment investment. T. A. Taylor is president and general manager.

The Prairie du Chien, Wis., Tool Co., manufacturer of wrenches, tools and automotive specialties, has increased its capital stock from \$50,000 to \$100,000 to provide for additions, purchase of new equipment and generally accommodate the expansion of the business.

The Racine Pure Milk Co., Racine, Wis., has engaged Cahill & Douglas, consulting engineers, 217 West Water Street, Milwaukee, to design and contract for the erection and equipment of a new boiler house, 30 x 50 ft., with a 125-ft. stack.

The Durant Motor Sales Co., Wausau, Wis., will build a two-story brick sales and service building, 60 x 80 ft., designed by Oppenhamer & Obel, architects, Wausau and Green Bay, Wis. It will cost about \$25,000 complete. Max L. Tisch, 208 Washington Street, is proprietor.

The Perrigo Foundry & Machine Co., Beloit, Wis., has been incorporated with a capital stock of \$150,000 to manufacture iron, steel and other metal products. It succeeds to the business established by William S. Perrigo, 808 Emerson Street, and J. E. Halverson, who have been engaged in the foundry and machine shop business in Beloit for many years.

The Janesville-Caloric Co., Janesville, Wis., has been organized by Walter McGill and M. A. Hudson of Chicago, and F. M. Coyle, Janesville, to take over the local factory of the Stafford-Caloric Co., effective Nov. 1. The new owners will until Jan. 1 continue the manufacture of folding chairs for the Stafford company of Chicago, and meanwhile remodel and retool parts of the factory for the production of electric fireless cookers, with a daily capacity of 400 to 500. M. A. Hudson is vice-president in charge of production, and F. M. Coyle, present general superintendent, will continue in this capacity.

The Michigan State Board of Industrial Education has let the general contract to the Albinson Construction Co., Minneapolis, Minn., for a training school at Marquette, Mich., to cost \$178,772. Other contracts and the equipment will make the total cost approximately \$275,000.

The Stratford, Wis., Light & Power Co., has applied for permission to issue \$15,000 in new securities to build a substation and erect a light and power transmission line for local service. Current is purchased from the Wisconsin Valley Electric Co., Wausau, Wis.

The Wisconsin Cylinder Foundry Co., Racine, Wis., has increased its capitalization from \$50,000 to \$75,000 and will employ the new issue to enlarge production. It specializes in gas engine cylinder castings.

The F. & G. Auto Parts Co., Stevens Point, Wis., started work Nov. 1 on a one-story brick addition, 35 x 102 ft.

The Drummond, Wis., Board of Education let the general contract for a new \$125,000 high school and manual training institute to N. F. Weaver, Owen, Wis.

Indiana

INDIANAPOLIS, Nov. 6.

W. H. COLLINS, South Bend, Ind., and J. B. White and C. E. Hadsell, both of Fort Wayne, Ind., have acquired the plant of the Rapid Rim Co., Huntington, Ind., at public sale for \$75,000. The new owners will take immediate possession and will organize a company to manufacture enamel ware products.

The Noblesville Heat, Light & Power Co., Noblesville, Ind., will commence the installation of machinery in its hydroelectric power plant on the White River, estimated to cost \$150,000.

The Fort Wayne Corrugated Paper Co., Murray and Barr Streets, Fort Wayne, Ind., has commissioned Mills, Rhines, Bellman & Nordhoff, 1234 Ohio Building, Toledo, Ohio, to prepare plans for a one and two-story branch plant at Hartford City, Ind., estimated to cost \$70,000.

The Board of Sanitary Commissioners, City Hall, Indianapolis, has advanced the date for the receipt of bids for machinery for the municipal sewerage disposal plant to Nov. 14. The installation will include a power plant with prime movers, coal-handling equipment, pumping machinery, feed-water heaters, etc.

Hammond & Jeffers, Indianapolis, contractors, with branch at Kansas City, Mo., have leased the old car shops of the Chicago & Eastern Illinois Railroad Co., Brazil, Ind., for the establishment of a general car repair works. Plans are being completed for remodeling the buildings and for extensions, with the installation of additional equipment. Contract for car and locomotive repairs has been secured from the Cincinnati, Indianapolis & Western Railroad Co.

The Fort Wayne Foundry & Machine Co., Fort Wayne, Ind., manufacturer of architectural and other iron products, has tentative plans for an addition estimated to cost \$65,000.

The Indiana Power Co., Indianapolis, has secured permission to issue bonds for \$250,000, a portion of the proceeds to be used for extensions.

Motor-driven pumping machinery will be installed in the new pumping plant at the municipal works, Mishawaka, Ind., estimated to cost \$50,000, for which plans are being prepared by Burns & McDonnell, 402 Interstate Building, Kansas City, Mo. The Board of Public Works is in charge.

The Central South

ST. LOUIS, Nov. 6.

PLANS are under way by the Grace Sign & Mfg. Co., 425 South Main Street, St. Louis, manufacturer of metallic signs, etc., for a new two-story and basement factory, 130 x 160 ft., estimated to cost \$100,000, including equipment. Paul R. Grace is president.

The Missouri-Pacific Railroad Co., St. Louis, is completing plans for new machine repair shops at Wichita, Kan., estimated to cost \$80,000. John R. Nagel is chief engineer.

The North Missouri Power Co., Brookfield, Mo., formerly known as the Brookfield Electric Light Co., has plans under way for extensions and improvements to cost \$150,000. New boilers, superheaters, stoker grates and electrical equipment will be installed.

The White Oak Corporation, Knoxville, Tenn., is making inquiries for a marine-type boiler, about 500 hp., with auxiliary equipment.

The Kansas Electric Power Co., Leavenworth, Kan., is disposing of a bond issue of \$1,000,000, a portion of the proceeds to be used for extensions and improvements.

W. N. McIlvain, city clerk, Phillipsburg, Kan., will receive bids until Nov. 20 for a water filtration plant, including four centrifugal pumps, gasoline engine, valves, sluice gates, etc. Black & Veatch Mutual Building, Kansas City, Mo., are engineers.

The Lion Oil & Refining Co., Kansas City, Mo., has completed plans for an addition to its refinery at El Dorado, Ark., with installation to include stills, pressure valves, tanks, refinery machinery and auxiliary equipment, estimated to cost close to \$100,000. Victor H. Smith is vice-president.

The Western Union Telegraph Co., 195 Broadway, New York, has plans nearing completion for a new general car building and repair plant at Chattanooga, Tenn., estimated

to cost \$250,000, including machinery. It will adjoin the existing plant of the company for railroad motor car repairs.

The Mississippi River Commission, First and Second Districts, Memphis, Tenn., will take bids until Dec. 2 for machinery for a hydraulic grader, including turbines, boiler feed pumps, general pumping machinery, feed-water heater, electric light plant, etc., as per specifications on file; also under another contract, for boilers for the grader.

The Styles Mfg. Co., Bolivar, Mo., has tentative plans under consideration for the establishment of a new plant in a neighboring district and the removal of its present works. The company specializes in the manufacture of gravel loaders and other loading machinery.

The Board of Public Improvements, City Hall, St. Louis, is considering plans for a new municipal electric power plant, estimated to cost \$1,000,000, including machinery.

Motors, controllers, transmission machinery and other equipment will be installed in the new printing plant to be erected by the Gibbs-Inman Co., Louisville, estimated to cost \$110,000.

The Duncan Machinery Co., Knoxville, Tenn., machinery dealer, is making inquiries for a line of wood-working machinery, suitable for hardwood, rough and finished production.

The Kansas City Southern Railway Co., Kansas City, Mo., is said to be arranging a fund of about \$1,000,000 for its new shops at Pittsburg, Kan., for which preliminary plans are in progress. W. G. Morgan is division engineer in charge.

The Dixie Spinning Mill Co., Volunteer Life Building, Chattanooga, Tenn., will build a power house in connection with its new cotton mill, estimated to cost \$500,000. Roberts & Co., Red Cross Building, Atlanta, Ga., are engineers.

The Tennessee Central Railway Co., Nashville, Tenn., is planning to rebuild its car and locomotive shops, destroyed by fire Oct. 27, with loss approximating \$400,000, including buildings, equipment and rolling stock. Pending the completion, the company is perfecting arrangements to use a portion of the plant of the William J. Oliver Mfg. Co.

The Board of Directors, Consolidated School District No. 3, Fayette, Mo., will build an electric light and power plant in connection with an addition to the local school.

O. L. Wright, Maysville, Mo., and associates, Maysville, Mo., have plans under way for enlargements in the electric power plant, recently acquired, to include the installation of electrical equipment, engines, pumps, etc.

The Biltwell Factories, Inc., Wichita, Kan., is planning for the installation of machine tools and wood-working machinery at its plant, 1414 South Washington Avenue. C. W. Rogers is one of the heads of the company.

The Pipe & Foundry Co., Thirty-second Street and West-side Avenue, Chattanooga, Tenn., will lay foundations at once for a one-story foundry addition, 150 x 200 ft., estimated to cost \$45,000. John Parks & Co., Hamilton National Bank Building, are architects.

The Edgerton Milling Co., Edgerton, Mo., is planning for the installation of new power equipment, including boiler apparatus, feed-water heater, pumps, etc.

The Common Council, Milan, Mo., has plans in progress for the erection of a municipal electric power plant, with initial capacity of about 300 hp. and will soon call for equipment.

The Common Council, Cement, Okla., has arranged a bond issue of \$33,000 for extensions in the municipal electric light and power plant, including additional equipment.

Canada

TORONTO, Nov. 6.

THE general tone of the machine-tool market continues to show improvement, with the railroads taking more interest than formerly. Industrial concerns are buying more freely, both for replacement and new works, and as a result dealers' and manufacturers' orders are well up to expectations. The increased industrial activities are also having a stimulating effect on the demand for small tools. Prices continue firm and unchanged.

In addition to the order recently placed for the St. Malo shops at Quebec and the Moncton, N. B., shops, the Canadian National Railways have just ordered the following equipment for shops in western Canada: One 36-in. Bertram heavy vertical drilling machine; one 51-in. Bertram vertical standard boring and turning mill; one Pond type rebuild engine lathe; four Canada Machinery Corporation lathes, 24 x 44 in.; one Alfred Herbert No. 4 capstan turret lathe; one Hammett radius link grinder; two Southwark hydraulic spring testing machines, capacity 35 tons; one model E power driven pipe bending machine; one Underwood portable crank

pin turning machine; three pipe cutting and threading machines; one Kearney & Trecker No. 3 universal milling machine.

H. Johnson, Truro, N. S., will build a machine shop and foundry and is interested in prices for equipment.

The Ford Motor Co. of Canada, 672 Dupont Street, Toronto, is preparing to erect a manufacturing plant on Danforth Avenue to cost approximately \$500,000.

The Powell River Pulp & Paper Co., Powell River, B. C., is arranging for the erection of a pulp and paper plant and is receiving prices on general equipment, etc.

The sawmill and manufacturing plant owned by the E. T. Nesbitt Co., 74 Tenth Avenue, Limoulu, Quebec, was destroyed by fire Oct. 31, with a loss to building and equipment amounting to \$75,000.

The Sydenham Brick & Tile Co., Wallaceburg, Ont., is contemplating removing its plant to a new location, suitably provided with railroad sidings, and will also install additional equipment, including driers, conveying machinery, etc.

The Red Wing Quarry Co., Ltd., North Bay, Ont., has secured 8 acres and will proceed with the erection of a plant for preparing building material. It is estimated that about \$50,000 worth of new equipment will be required. The company has a capital stock of \$500,000 and the officers include Arthur T. Stone, president; J. H. Bremer, secretary treasurer; Homer Stockdale, general manager, all of whom reside in North Bay.

The False Creek Lumber Co., 6th Avenue West, Vancouver, B. C., is having plans prepared for the erection of a lumber mill to cost \$150,000.

A. D. Snider & Son, Carter-Cotton Building, Vancouver, B. C., have the general contract for a machine shop costing \$10,000 for the Burrard Iron Works, Alexander Street, Vancouver.

The City Council, Paisley, Ont., is having plans prepared for the construction of a power development plant on Little Saugeen River.

The Nova Scotia Steel & Coal Co., Ltd., Sydney Mines, N. S., will build a pumping plant at a cost of \$85,000. Mr. Purves is engineer.

Plans are being prepared for a sewage disposal plant at Sandwich, Ont., to cost \$150,000. McColl & Patterson, Gas Building, are engineers.

STEEL AND INDUSTRIAL STOCKS

Active Trading Follows Losses in the Early Part of the Week

Though considerable losses were felt in steel and industrial stocks during the early part of last week, good recoveries and active trading marked the close. The business revival foreshadowed many weeks ago in the light of steel activities is clearly evident. At the outset reactionary movements and, for a time, ragged prices appeared as forebodings of a break. On Thursday, however, this anxiety was dispelled by a sharp rally which continued through Friday, though some profit taking and further bear selling slightly dampened the action. The improving sentiment brought fresh demands. Disappointment over the report of the U. S. Steel Corporation caused only a flurry; then its normal status was resumed. The average of 20 industrial stocks was 99.2, against 98.7 over last week.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

	Low	High		Low	High
Allis-Chalm.	42 3/4	46	Int. Har.	103 1/2	107
Allis-Chalm. pf. .	95	96	Int. Har. pf.	118 1/2	118 1/2
Am. B. S. & F. .	73	76	Lack. Steel	78 1/2	82 1/2
Am. B. S. & F. pf.110	110		Lima Loco.	58	61 1/2
American Can. .	68 3/4	76 1/2	Lima Loco. pf. .	122 1/2	123
American Can pf.109 1/2	110 1/2		Midvale Steel .	29 1/2	32 1/2
Am. Car & Fdry.179 1/2	187		Nat.-Acme	13 1/2	13 3/4
Am. C. & F. pf.124	125 1/2		Nat. En. & Stm. .	62	68 1/2
Am. Locomotive.122 1/2	129		N. Y. Air Brake	32 1/2	34 1/2
Am. Loco. pf.	121	121 1/2	Nova Scotia Steel	32	32
Am. Radiator	111 1/2	118	Otis Steel	9 1/2	10 1/2
Am. Steel Fdries 41 1/2	45 1/2		Otis Steel pf. .	53	53
Am. Stl. F. pf.	104 1/2	107	Pressed Steel Car	30 1/2	35 1/2
Baldwin Loco. .	127	134	Pressed Steel pf.	99 1/2	102
Baldwin Loco. pf.117	118		Ry. Steel Spring.114	118	
Bethlehem Steel. .	68	70	Ry. Stl. Spg. pf.116	119	
Beth. Stl. Cl. B. .	66 1/2	72	Replogie Steel .	26 1/2	29 1/2
Beth. Steel 8% pf.111	112		Republic	47 1/2	51 1/2
Brier Hill	16 1/2	16 1/2	Republic pf.	40	45 1/2
Br. Em. Steel. .	11 1/2	11 1/2	Sloss	60	63
Br. Em. S. 1st pf 74	74		Steel of Canada	34	35
Br. E. S. 2d pf. .	30 1/2	31 1/2	Superior Steel .	30 1/2	32
Cambria Steel .	41	41	Trans.-Williams.	32 1/2	33 1/2
Chic. Fneu. Tool .	75	84 1/2	Un. Alloy Steel. .	34	35 1/2
Colorado Fuel .	28 1/2	30 1/2	U. S. Pipe & Fdy	27 1/2	30
Crucible Steel. .	73	79 1/2	U. S. Pipe & F. pf 69	69	70 1/2
Crucible Steel pf.	93 1/2	95	U. S. Steel	103 1/2	107 1/2
Deere, pf.	72	74	U. S. Steel pf. .	119 1/2	122 1/2
Gen. Electric .	174	180	Vanadium Steel. .	35 1/2	41 1/2
Gt. No. Ore Cert.	32 1/2	34 1/2	Va. I. C. & Coke	59	59 1/2
Gulf States Steel	85 1/2	93 1/2	Whouse Air Br. .	95	96
Harbison Walker.115	115				

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

Bars:	
Refined iron bars, base price.....	3.04c.
Swedish bars, base price.....	7.50c.
Soft steel bars, base price.....	3.04c.
Hoops, base price.....	4.39c.
Bands, base price.....	3.84c.
Beams and channels, angles and tees	
3 in. x ¼ in. and larger, base.....	3.14c.
Channels, angles and tees under 3 in.	
x ¼ in., base.....	3.04c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger.....	3.10c.
(Smooth finish, 1 to 2½ x ¼ in. and larger) ..	3.30c.
Toe-calk, ½ x ¾ in. and larger.....	4.15c.
Cold-rolled strip, soft and quarter hard..	6.75c. to 7.25c.
Open-hearth spring steel.....	4.50c. to 7.00c.
Shafting and Screw Stock:	
Rounds.....	3.90c.
Squares, flats and hex.....	4.40c.
Standard cast steel, base price.....	15.00c.
Extra cast steel.....	18.00c.
Special cast steel.....	23.00c.

Tank Plates—Steel

¾ in. and heavier.....	3.14c.
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Sheets

Blue Annealed

	Per Lb.
No. 10.....	4.19c.
No. 12.....	4.24c.
No. 14.....	4.29c.
No. 16.....	4.39c.

Box Annealed—Black

	Soft Steel C. R., One Pass, Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20.....	4.30c. to 4.70c.	.....
Nos. 22 and 24.....	4.35c. to 4.75c.	5.00c.
No. 26.....	4.40c. to 4.80c.	5.05c.
No. 28.....	4.50c. to 4.90c.	5.15c.
No. 30.....	4.75c. to 5.15c.	.....
No. 28 and lighter, 36 in. wide, 10c. higher.		

Galvanized

	Per Lb.
No. 14.....	4.60c. to 5.00c.
No. 16.....	4.75c. to 5.15c.
Nos. 18 and 20.....	4.90c. to 5.30c.
Nos. 22 and 24.....	5.05c. to 5.45c.
No. 26.....	5.20c. to 5.60c.
No. 27.....	5.35c. to 5.75c.
No. 28.....	5.50c. to 5.90c.
No. 30.....	6.00c. to 6.40c.
No. 28 and lighter, 36 in. wide, 20c. higher.	

Welded Pipe

Standard Steel

	Black	Galv.
½ in. Butt... —50	—42	
¾ in. Butt... —55	—44	
1-3 in. Butt... —57	—44	
2½-6 in. Lap... —54	—41	
7-8 in. Lap... —50	—26	
9-12 in. Lap... —46	—25	

Wrought Iron

	Black	Galv.
½ in. Butt... —11	+13	
¾ in. Butt... —17	—1	
1-1½ in. Butt... —20	—2	
2 in. Lap... —14	+2	
2½-6 in. Lap... —18	—2	
7-12 in. Lap... —10	+6	

Steel Wire

BASE PRICE* ON NO 9 GAGE AND COARSER

	Per Lb.
Bright basic.....	4.75c. to 5.00c.
Annealed soft.....	4.75c. to 5.00c.
Galvanized annealed.....	5.40c. to 5.65c.
Coppered basic.....	5.40c. to 5.65c.
Tinned soft Bessemer.....	6.40c. to 6.65c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet.....	19¼c. to 20¼c.
High brass wire.....	20¼c. to 20¾c.
Brass rod.....	16¼c. to 17¼c.
Brass tube, brazed.....	26¼c. to 27¼c.
Brass tube, seamless.....	23 c. to 23¼c.
Copper tube, seamless.....	25¼c. to 26 c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 22¼c. to 23¼c. per lb. base.
Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
IC..	\$10.00	\$8.50	80 lb..	\$6.05	\$5.80
IX..	11.50	10.00	90 lb..	6.15	5.90
IXX..	13.00	11.25	100 lb..	6.25	6.00
IXXX..	14.25	12.50	IC..	6.40	6.15
IXXXX..	16.00	14.00	IX..	7.40	7.15
			IXX..	8.40	8.15
			XXX..	9.40	9.15
			IXXXX..	10.40	10.15

Terne Plates

8-lb. coating, 14 x 20

100 lb.	\$7.00
IC.....	7.25
IX.....	7.50
Fire door stock.....	9.00

Tin

Straits pig.....	39c.
Bar.....	45c. to 50c.

Copper

Lake ingot.....	15¼c.
Electrolytic.....	15 c.
Casting.....	14¼c.

Spelter and Sheet Zinc

Western spelter.....	8¼c.
Sheet zinc, No. 9 base, casks.....	10¼c. open 10¼c.

Lead and Solder*

American pig lead.....	8c. to 8¼c.
Bar lead.....	9c. to 10c.
Solder, ½ and ½ guaranteed.....	27¼c.
No. 1 solder.....	26c.
Refined solder.....	23¼c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.....	75c.
Commercial grade, per lb.....	35c.
Grade D, per lb.....	25c.

Antimony

Asiatic.....	8¼c. to 9c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb....	25c. to 27c.
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Old Metals

White metals are active, particularly lead, but scrap copper and brass are very dull. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible.....	12.00
Copper, heavy wire.....	11.50
Copper, light and bottoms.....	9.50
Brass, heavy.....	6.50
Brass, light.....	5.50
Heavy machine composition.....	8.50
No. 1 yellow brass turnings.....	6.50
No. 1 red brass or composition turnings.....	8.00
Lead, heavy.....	5.75
Lead, tea.....	4.25
Zinc.....	4.25

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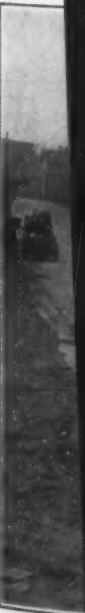
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1/4 c.
1/4 c.
1/4 c.
10c.
7 1/2 c.
.26c.
3 1/4 c.
cord-
.75c
.35c
.25c
to 9c.
to 27c.
scrap
prices
Cents
Per Lb.
.12.00
.11.50
.9.50
.6.50
.5.50
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.6.50
.8.00
.5.75
.4.25
.4.25